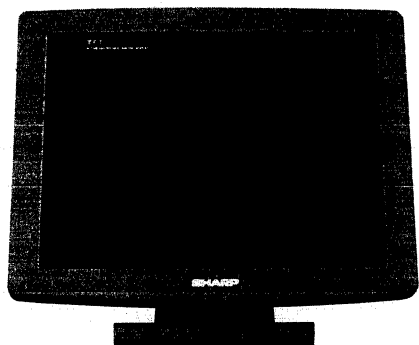


**SHARP****SERVICE MANUAL**

S1425QD-100MM

**TFT DISPLAY UNIT****MODEL QD-100MM**

In the interests of user-safety (Required by safety regulation in some countries), the set should be restored to its original condition and only parts identical to those specified should be used.

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**SHARP CORPORATION**

## INTRODUCTION

The liquid crystal display monitor QD-100MM is capable of displaying images from composite video signals (NTSC, PAL, SECAM) generated by sources such as VCRs, as well as computer-generated video signals. The display component of the QD-100MM is a 10.4-inch TFT (thin film transistor) color LCD panel.

The power source is an external self-configuring AC adaptor with world-wide compatibility that provides 12.9 Volts DC to the display monitor unit.

The QD-100MM also has a speaker to monitor audio signal. In addition, an external control terminal has been provided to facilitate remote control of the display unit's functions.

# SPECIFICATIONS

## 1.SPECIFICATIONS OF MAIN BODY

1. Power source voltage and frequency requirements : AC100V/120V/220V/240V,50/60Hz  
(for external AC adaptor)
2. Power consumption : 43.0W AC(for external AC adaptor)  
34.0W DC(DC12.9V)
3. Display area : 334.5cm<sup>2</sup> Diagonal: 264.0 mm (10.4 inches)  
Width : 211.2 mm  
Height : 158.4 mm
4. External dimensions (display unit only) : 324 mm (W) × 280 mm (H) × 74.5 mm
5. Weight (display unit only) : Approx. 2.6 kg
6. Cabinet material (front cover) : Polycarbon alloy  
(back cover) : Polycarbon alloy  
(stand) : Aluminum
7. LCD panel
  - 1) Display method : Active matrix (Amorphous-Silicon TFT)
  - 2) Effective display area : Diagonal 264 mm (10.4 inches)  
Width 211.2 mm  
Height 158.4 mm
  - 3) Resolution : 640 pixels (RGB) × 480 lines
  - 4) Dot pitch : 0.33 mm (W) × 0.33 mm (H)
  - 5) Pixel configuration : RGB vertical stripe
8. Backlight : 4 hot-cathode fluorescent tubes
9. Input signals
  - 1) Video input(NTSC/PAL/SECAM) : Video Composite, S-video  
Personal computer : Analog RGB, Digital RGB, Sync signal
  - 2) Audio input : Monaural
  - 3) External controller : PC/Video switch, Power On/Off, Sound mute
10. Color depth : 16,194,277 colors
11. Input connectors
  - 1) Video input : 15-pin mini D-Sub socket  
RCA pin jack (composite)  
Mini DIN 4P (S-video)
  - 2) Audio input : RCA pin jack
  - 3) Remote control input : Mini DIN 6P
  - 4) Power supply terminal : DC jack
12. AC adaptor
  - 1) AC leakage current : Exposed metal parts: less than 0.25 mA  
(with AC adaptor)

### 13. Control dials, switches

#### Top panel

: Power switch, Contrast control, Sub-brightness control, video controls (Video level, Sharpness, Color, Tint)

Select button (Horizontal picture position, Vertical picture position, Clock frequency, Clock phase)

Up button, Down button, Memory button, Reset button

#### Side panel

: Brightness control, Volume control, PC/Video selector

### 14. LED displays

: Power

Selection monitor (H-POS, V-POS, PHASE, FREQ)

### 15. Mechanical strength

#### 1) Vibration

: Vibration range: 10~57Hz/Half amplitude: 0.075mm  
58~500Hz/Acceleration: 1G

Sweep time : 11 min.

Test period : 3 hours

(1 hour each in x, y, and z directions)

#### 2) Shock

: Maximum acceleration : 50 G

Pulse width : 11 ms sine wave

Direction :  $\pm X, \pm Y, \pm Z$

No. of times : once in each direction

### 16. Shipping endurance (packaged)

#### 1) Drop height

: 75 cm (1 corner, 3 edges, 6 surfaces)

#### 2) Vibration

Acceleration 1G, Vibration range 5~50Hz

Sweep time 3min

Vertical 30 min., Front/back, side/side 15 min. each

### 17. Miscellaneous

#### 1) External appearance

: (See Fig.33)

#### 2) Packaged with

: AC Adaptor, Adjustment driver, operation manual, AC cord

#### 3) Sold separately

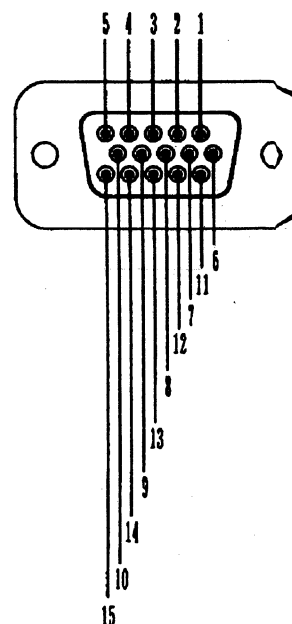
: Video connector cable

## 2. SPECIFICATIONS OF INTERFACE

### 2.1. Computer video signal Input selection

#### Input signal layout:

- |                          |                             |
|--------------------------|-----------------------------|
| 1. Analog Red            | 9. MAC Select               |
| 2. Analog/Digital Green  | 10. Analog/Digital Select   |
| 3. Analog/Digital Blue   | 11. Analog GND              |
| 4. Digital Secondary Red | 12. Digital Secondary Green |
| 5. Digital Red           | 13. H/C Sync.               |
| 6. Red Return            | 14. V Sync.                 |
| 7. Green Return          | 15. Digital Secondary Blue  |
| 8. Blue Return           |                             |





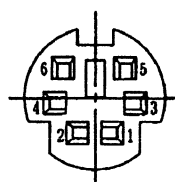
- Connector : Mini D-Sub 15pin connector
- Macintosh Select : When connecting to Apple Macintosh LC [and other models with on-board video], or Macintosh II video cards, this terminal must be grounded.  
Leave this terminal open (N.C.) when connecting to other types of personal computers.
- Analog/Digital Select : This terminal must be grounded when inputting analog-type personal  
(\*) computer video signals.  
Leave this terminal open (N.C.) when inputting digital personal computer video signals.

(\*) The unit cannot be configured to accept both analog RGB and digital RGB signals at the same time. One of the signals must be left open (N.C.).

## 2.2.External control terminal

Control terminal configuration :

- |                     |         |
|---------------------|---------|
| 1. Sound Control    | 4. N.C. |
| 2. PC/VIDEO Control | 5. N.C. |
| 3. Power Control    | 6. GND  |



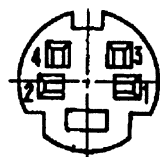
## 2.3.Composite video signal terminal

Pin jack corresponding to EIAJ RC-6702A

## 2.4.S-Video signal terminal

Control terminal configuration :

1. GND
2. GND
3. Y-signal (Luminance)
4. C-signal (Chrominance)



# 3. SPECIFICATIONS OF ENVIRONMENT

Specifications apply to main unit and accessories.

Table 1

Item		Specification	Remarks
Operating Environment	Operating Temperature	0~35℃	No dew condensation. Absolute humidity shall be less than 35℃/80% RH.
	Operating Humidity	20~80%	
Storage Environment	Storage Temperature	-20~60℃	
	Storage Humidity	20~80%	

# ADJUSTMENT OF P.W.B.

## 1.ADJUSTMENT OF MAIN CIRCUIT BOARD

The QD-100MM consists of the TFT module, the main circuit board (P.W.B.) and the inverter circuit board. These circuit boards are pre-adjusted before they leave the factory. If any subsequent repairs or maintenance are carried out as described below, the circuits must be correctly readjusted.

All necessary adjustments are carried out on the main P.W.B. Be sure to use a non-electrical conducting screwdriver, preferably a ceramic-type one, for all adjustments.

There are 22 adjustment points on the main P.W.B., of which 2 are in the Power Supply Block, 11 are in the Decoder Block, 3 are in the PC Signal Input Block and 6 are in the Picture Adjustment Block. When replacing the entire main circuit board, only the adjustments described in paragraph 1.1.(4) need to be carried out.

### 1.1.Voltage Adjustments on the Power Supply Block

See page.69, when adjusting.

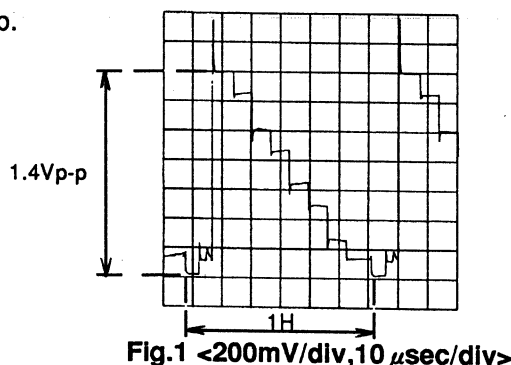
- 1) Disconnect connectors CN1, CN2, CN4, CN6, and CN11 prior to adjusting the power supply.
- 2) Connect the AC adapter to the main unit and check that the AC adapter is supplying between 12.3 V and 14.2 V.
- 3) Turn on the Power switch. Check that the fan motor is running and the Power LED is lit.
- 4) Measure the voltage across TP4 and TP5, and adjust VR6 until the voltage is  $510 \pm 0.1$  mV.  
After making this adjustment, measure the voltage across TP5 and TP15 to make sure it is  $5 \pm 0.12$  V.
- 5) Measure the voltage across TP3 and TP15, and adjust VR7 until the voltage is  $11.76 \pm 0.01$  V.
- 6) After the adjustments are completed, turn the Power switch off and reconnect CN1, CN2, CN4, CN6, and CN11.

## 2.ADJUSTMENT OF DECODER BLOCK

Before making any adjustments, preset the Video-level, P-tone, Color and Tint variable resistors to their central positions. Input the TP14 signal as the trigger signal to B channel of a oscilloscope in order to catch the following signals normally. Oscilloscope must be terminated with  $75 \Omega$  to adjust correctly.

### 2.1.Adjusting the Video Output Level

- 1) Input an NTSC color bar(Y-100%, C-0% : Fig.10-A) through the S-Video terminal.
- 2) Measure the signal from TP7 to TP15 (GND) with a oscilloscope. Adjust VR13 until the voltage waveform is 1.4 Vp-p.



- 3) Measure the signal from TP6 to TP15 in the same way and adjust VR16 until the voltage waveform is 1.4 Vp-p.
- 4) Measure the signal from TP8 to TP15 in the same way and adjust VR15 until the voltage waveform is 1.4 Vp-p.

## 2.2.Adjusting Color and Tint

- 1) Input an NTSC color bar(Y-75%, C-75% : Fig.10-B) through the S-Video terminal.
- 2) Measure the signal from TP8 to TP15 with a oscilloscope.  
Adjust VR20 and VR21 until waveforms become to the same height.

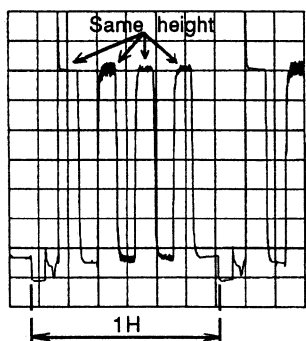


Fig.2 <200mV/div,10  $\mu$ sec/div>

## 2.3.Adjusting 1H DL for PAL

- 1) Input a PAL color bar(Y-0%, C-75% : Fig.10-C) through the S-Video terminal.
- 2) Connect a 6.8 k $\Omega$  resistor between TP16 and TP3.
- 3) Connect resistors to TP6 and TP8 as described below and measure the mid-point with a oscilloscope.

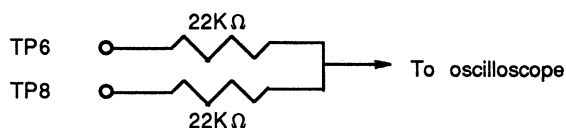
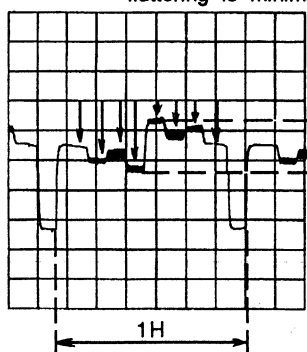


Fig.3

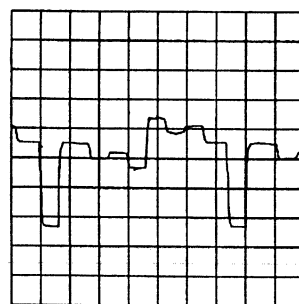
- 4) Adjust VR8 and T5 until the waveform conforms to the specifications below:

Adjust T5 so that wave  
fluttering is minimized.



(Before adjustment)

Adjust with VR8.



(After adjustment)

Fig.4 <500mV/div,10  $\mu$ sec/div>

#### 2.4. Adjusting the SECAM Bell Filter

- 1) Input a SECAM color bar(Y-75%, C-75% : Fig.10-D) through the S-Video terminal.
- 2) Monitor the signal from TP11 to TP15 with a oscilloscope. Adjust T6 until the waveform conforms to below.

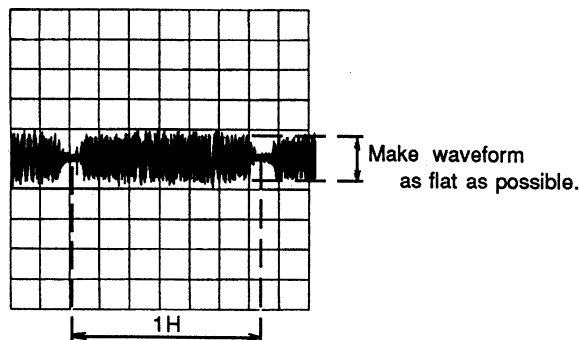


Fig.5 <500mV/div, 10  $\mu$ sec/div>

#### 2.5. Adjusting the SECAM Killer

- 1) Input a SECAM color bar(Y-75%, C-75% : Fig.10-D) through the S-Video terminal.
- 2) Measure the signal voltage from TP10 to TP15 with a oscilloscope. Adjust T7 until the voltage is at its highest possible value. (Reference: about 11 V)

#### 2.6. Adjusting the SECAM Discriminator

- 1) Input a SECAM color bar(Y-75%, C-75% : Fig.10-D) through the S-Video terminal.
- 2) Measure the signal voltage from TP12 to TP15 with a oscilloscope.  
Adjust T3 until the waveform conforms to the specifications below.

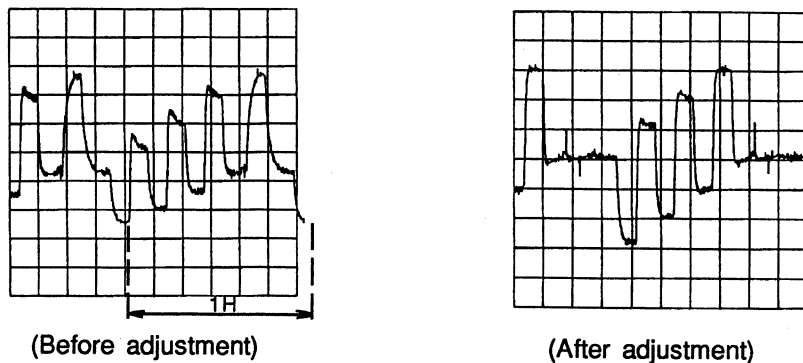


Fig.6 <500mV/div, 10  $\mu$ sec/div>

- 3) Monitor the signal from TP13 to TP15 with a oscilloscope.  
Adjust T4 until the waveform conforms to the specifications below.

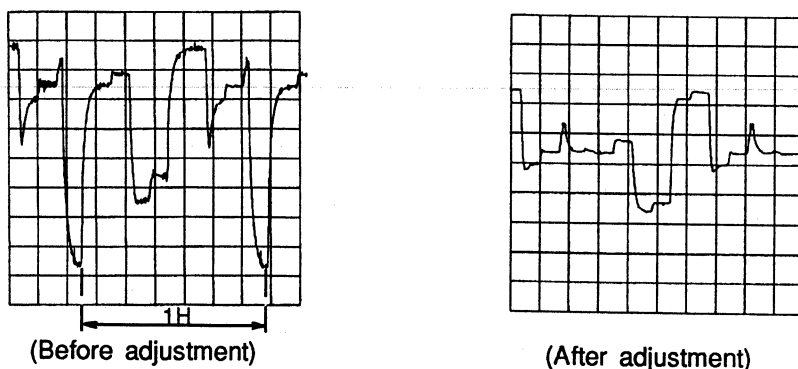


Fig.7 <500mV/div, 10  $\mu$ sec/div>

### 2.7.Adjusting the P-Tone

- 1) Input a NTSC FCC Multi Burst(Fig.10-E) through the S-Video terminal.
- 2) Monitor the signal from TP7 to TP15 with a oscilloscope.

Adjust VR14 until the waveform conforms to the specifications below.

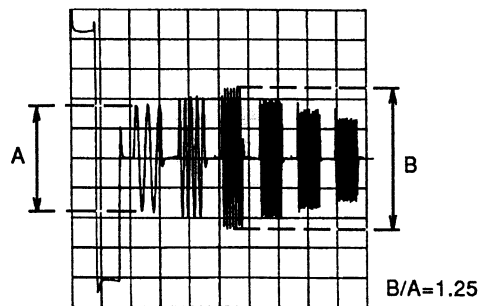


Fig.8 <200mV/div,5  $\mu$ sec/div>

## 3.ADJUSTMENT OF PICTURE ADJUSTMENT BLOCK

When making adjustments to this block it is necessary to check the picture while viewing the display panel straight on, not at an angle. Before making any adjustments, preset the Contrast, Brightness, and Sub-brightness variable resistors to their central positions.

### 3.1.Adjusting the Contrast and Brightness

- 1) Input an NTSC black signal(Y-0%, C-0% : Fig.10-F) though the S-Video terminal.
- 2) Adjust VR25 until the screen just begins to glow. Set VR25 in this position.
- 3) Input a 10-step gray-scale (100% white to 0%) signal(Fig.10-G) through the S-Video terminal.
- 4) Turn VR2 all the way to the maximum contrast position (the white will saturate).

Gradually turn the Contrast control towards MIN.

Set VR2 to the position where the difference between 100% white and 90% white just becomes visible.

- 5) Repeat steps 1) through 4) above about two or three times until the correct settings are reached.

### 3.2.Adjusting the White Balance

Adjustments on this section must be made while referring to a laboratory-use CRT TV monitor or other TV monitor of similar quality standards. (Preferably the white color temperature of the CRT monitor should be 6500° K)

- 1) Input 10-step gray-scale (100% to 0%) signal(Fig.10-G) through the S-Video terminals of both the CRT monitor and the QD-100MM.
- 2) Adjust the CRT monitor so that there is as little difference in brightness between the CRT monitor and the QD-100MM as possible.
- 3) Adjust VR26 through VR29 so that there is as little difference in color between the CRT monitor and the QD-100MM as possible. VR26(RED) and VR27(BLUE) control the bright areas, and VR28(RED) and VR29(BLUE) control the color in the dark areas.

Adjustments should be made alternating between bright area controls and dark area controls repeatedly until the best possible settings are reached.

Laboratory-use CRT monitor  
(or monitor of similar quality)

QD-100MM

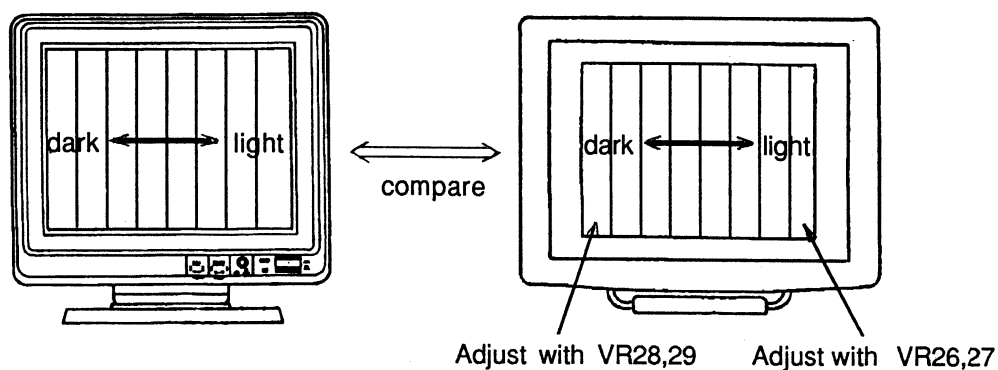


Fig.9

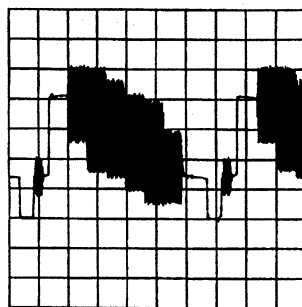
#### 4.ADJUSTMENT OF MICROPROCESSOR BLOCK

When replacing control processor IC7, be sure to reset all settings using the following procedure:

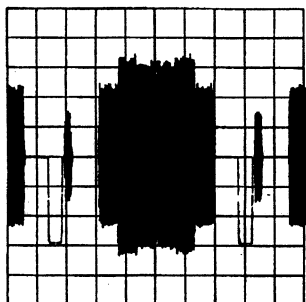
- 1) Simultaneously press the Select, Down and Reset buttons.
- 2) Press the Reset button again after at least 6 seconds.



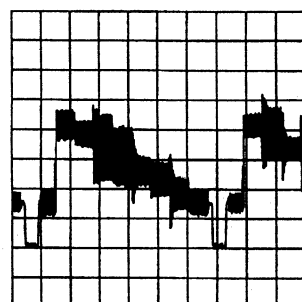
**NTSC COLOR BAR(Y-100%,C-0%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-A



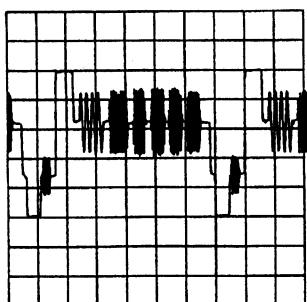
**NTSC COLOR BAR(Y-75%,C-75%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-B



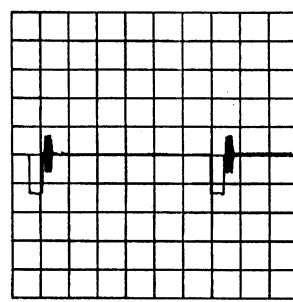
**PAL COLOR BAR(Y-0%,C-75%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-C



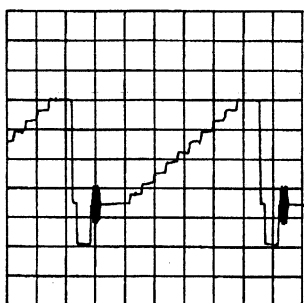
**SECAM COLOR BAR(Y-75%,C-75%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-D



**NTSC FCC MULTI BURST**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-E



**NTSC BLACK(Y-0%,C-0%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-F



**NTSC 10-STAIR STEP(Y-100%,C-0%)**  
 $<0.2V/div, 10 \mu sec/div>$   
 Fig.10-G

# CIRCUIT DESCRIPTION

## 1.GENERAL

Circuit will be described in reference to the BLOCK DIAGRAM in Fig.11.

On the main circuit board, the Decoder Block converts composite and S-Video input signals to RGB signal. S-Video signal has priority over composite signal. For computer video signals, digital RGB signal is converted to analog signal by D/A converter, and analog RGB signal is simply +6dB amplified. Then these RGB signals are inputted to the TFT module after the PC/Video selection is made.

After the sync signals are similarly inputted to the TFT module, they are sent back to the Microprocessor section of the Main P.W.B. where it is analyzed for recognition of type of computer (VGA, Macintosh II, etc.). The Microprocessor then sends the various control signals to the TFT module.

The unit requires a power supply of approximately 12.9V, which is internally regulated down to +5V, +9V and +12V sources which are sent to each block. The inverter circuit uses the 12.9V power supply directly, and powers the four hot-cathode fluorescent lamps in the backlight unit.

## 2.EXPLANATIONS OF EACH BLOCK ON THE MAIN P.W.B.

### 2.1.Composite and S-Video Circuit

The BLOCK DIAGRAM for this circuit is shown in Fig.12.

The QD-100MM can receive both composite and S-Video signals, in the NTSC, PAL, and SECAM formats.

NTSC, PAL, and SECAM signal recognition is done automatically in the Decoder Block. The identification signal is then processed by the Microprocessor Block which sends the appropriate control signal to the Y/C Separation circuit, so that Y/C separation can be carried out according to the type of input signal. The composite video signal is then separated into Y- (luminance) and C- (chrominance) signals.

If S-Video signal is inputted, the SYNC DETECTOR detects the sync. signal and sends the select signal to COMPOSITE/S SELECTOR so that S-Video signal is given priority.

The resulting luminance and chrominance signals are sent to the Decoder Block where they are decoded into Red, Green, and Blue signals.

The sync signal, C-sync. is separated from the luminance signal by SYNC SEPARATOR after passed through COMPOSITE/S SELECTOR. Because this sync signal in this circuit is Low when there is no signal, the Microprocessor Block can detect the presence or absence of a sync signal. If there is no signal, the Microprocessor Block processes the signal so that the sync separator output is set to High.



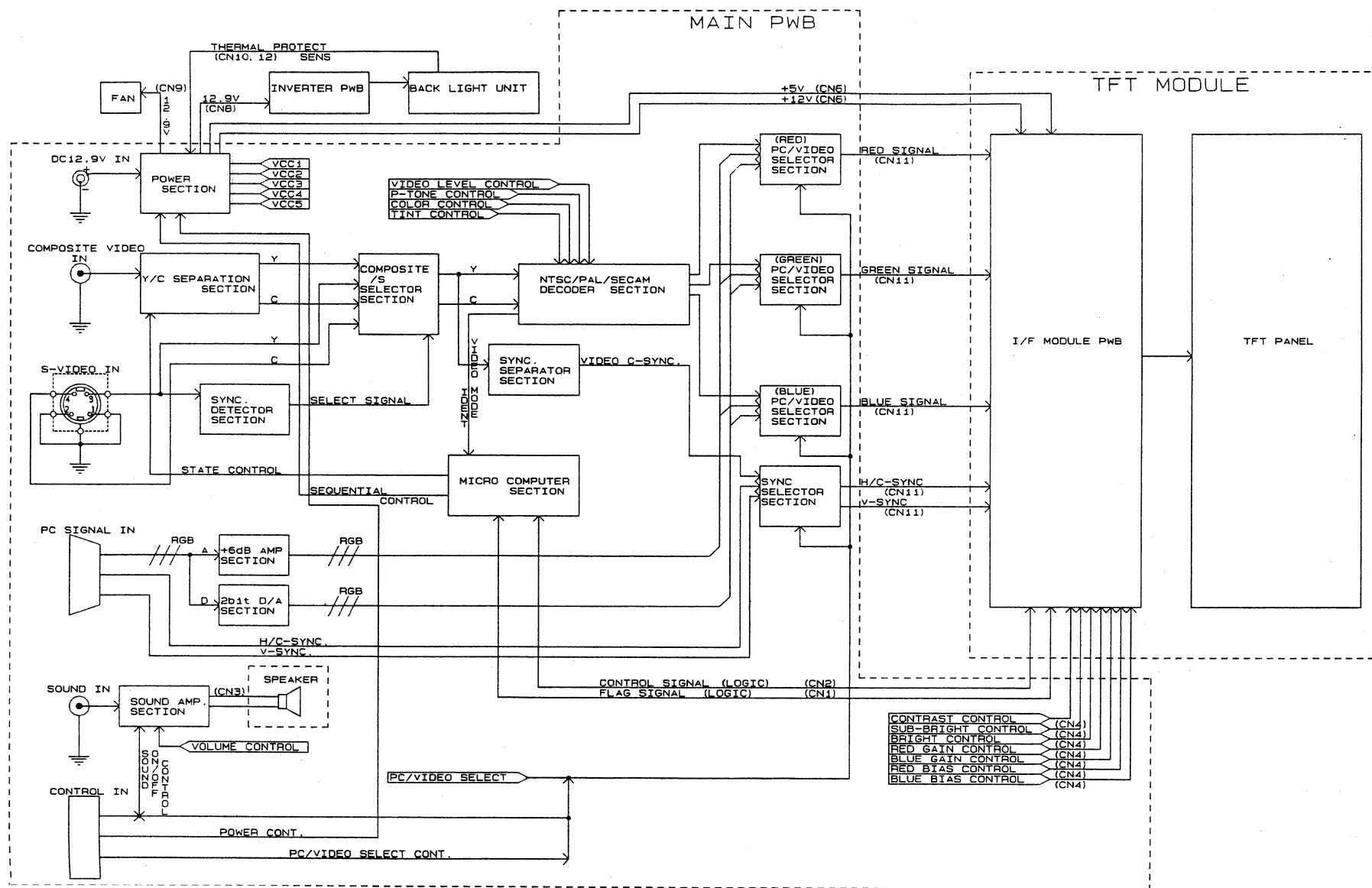


Fig. 11 QD-100MM BLOCK DIAGRAM

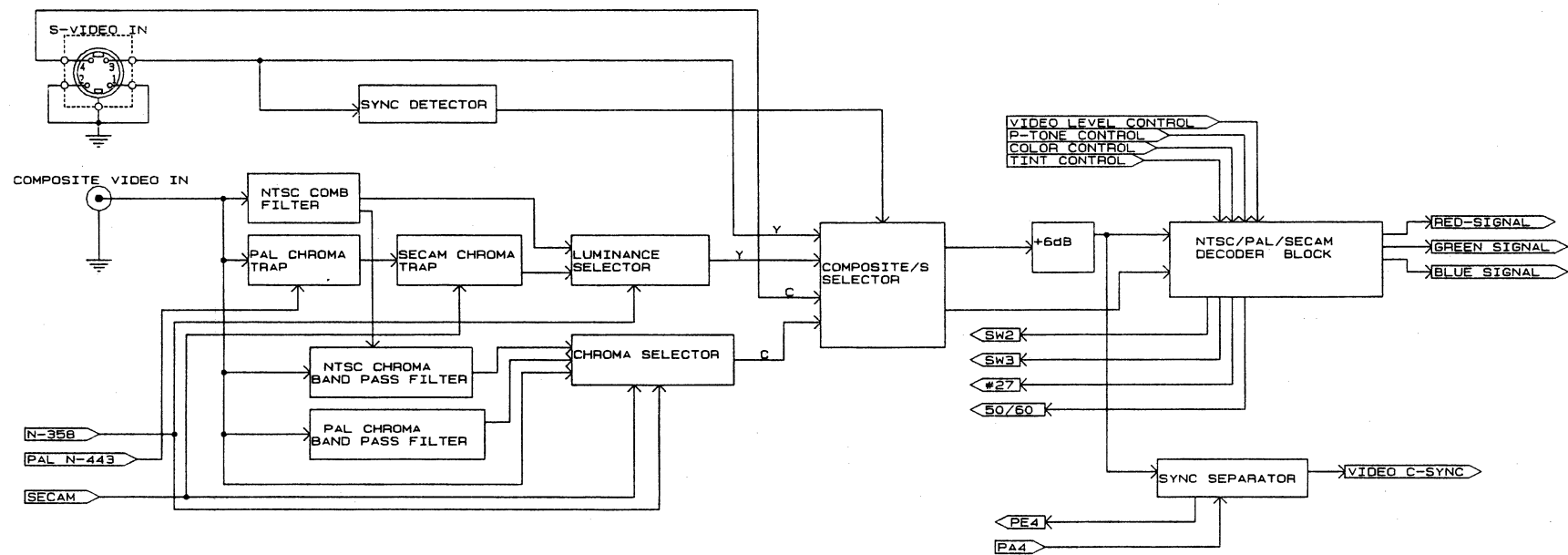


Fig. 12 COMPOSITE/S-VIDEO BLOCK DIAGRAM

### 2.1.1.Y/C Separation Circuit

The Y/C Separation circuit is shown in Fig.13.

Composite video signals inputted through the RCA pin jack are sent through each Y/C separation filter after passing through buffer Q11.

#### i) NTSC signals

Luminance(Y) signal is generated by removing Chrominance(C) signal by Comb Filter Module DL2.

After the luminance signal is removed from video signal by DL2, C signal is passed through buffer Q12 and then through the band pass filter circuit which is made up of C20, C21, L1 and R45.

The resulting Y- and C-signals are inputted to Luminance Selector IC4 and Chrominance Selector IC5, respectively.

#### ii) PAL signals

The Y-signal is extracted from the composite video signal by removing the C-signal component through Trap Filter T1, which is controlled by Q9. When Q9 is on, T1 becomes Active.

The C-signal is extracted by the band pass filter made up of R49, C28, L2 and C29.

These resulting Y and C signals are inputted to IC4 and IC5 in the same way as described in (i) above.

#### iii) SECAM signals

The Y-signal is extracted from the composite video signal by removing the chroma signal through Trap Filters T1 and T2. When Q10 is on, T2 becomes Active.

For SECAM, the C-signal is not extracted from the composite video signal; the composite video signal is used directly.

These resulting Y- and C-signals are inputted to IC4 and IC5 in the same way as described in (i) above. Luminance and Chrominance selectors IC4 and IC5 are controlled by the microprocessor depending on the type of input signal. Also, the operation of the above-mentioned trap filter is controlled by the microprocessor in the same way.

### 2.1.2.S-Video Input and the Sync Separator circuit

Fig.14 shows S-Video input circuit and Sync separator circuit.

IC1 detects the presence or absence using Y-signal from 4-pin mini DIN connector for S-Video.

This selector signal controls IC2 which selects either composite video or S-Video modes. When S-Video is inputted, IC2 selects S-Video regardless of the presence of composite video signals. That is to say, S-Video is given priority.

IC2 receives Y- and C-signals from the Y/C Separation circuit described in the previous paragraph and the Y- and C-signals from S-Video.

As for the Y- and C-signals outputted from IC2, only Y-signal is amplified by +6dB and distributed to the Decoder and Sync Separator circuits.

In the Sync Separator Circuit, noise is filtered out of the Y-signal by the low-pass filter comprised of R250 and C160, and then routed to sync separator IC21. A negative C-sync waveform is then outputted from IC21. This C-sync waveform is Low in the absence of a video signal, but because of the actual necessity for it to be set to High, the original C-sync signal is read by the Microprocessor Block from PE4, and in the absence of a signal a High-level set signal is outputted from PA4. This signal and the original C-sync signal are put through OR-gate IC23, and the resulting output becomes the video sync separator C-sync signal.(Refer to Fig.17)

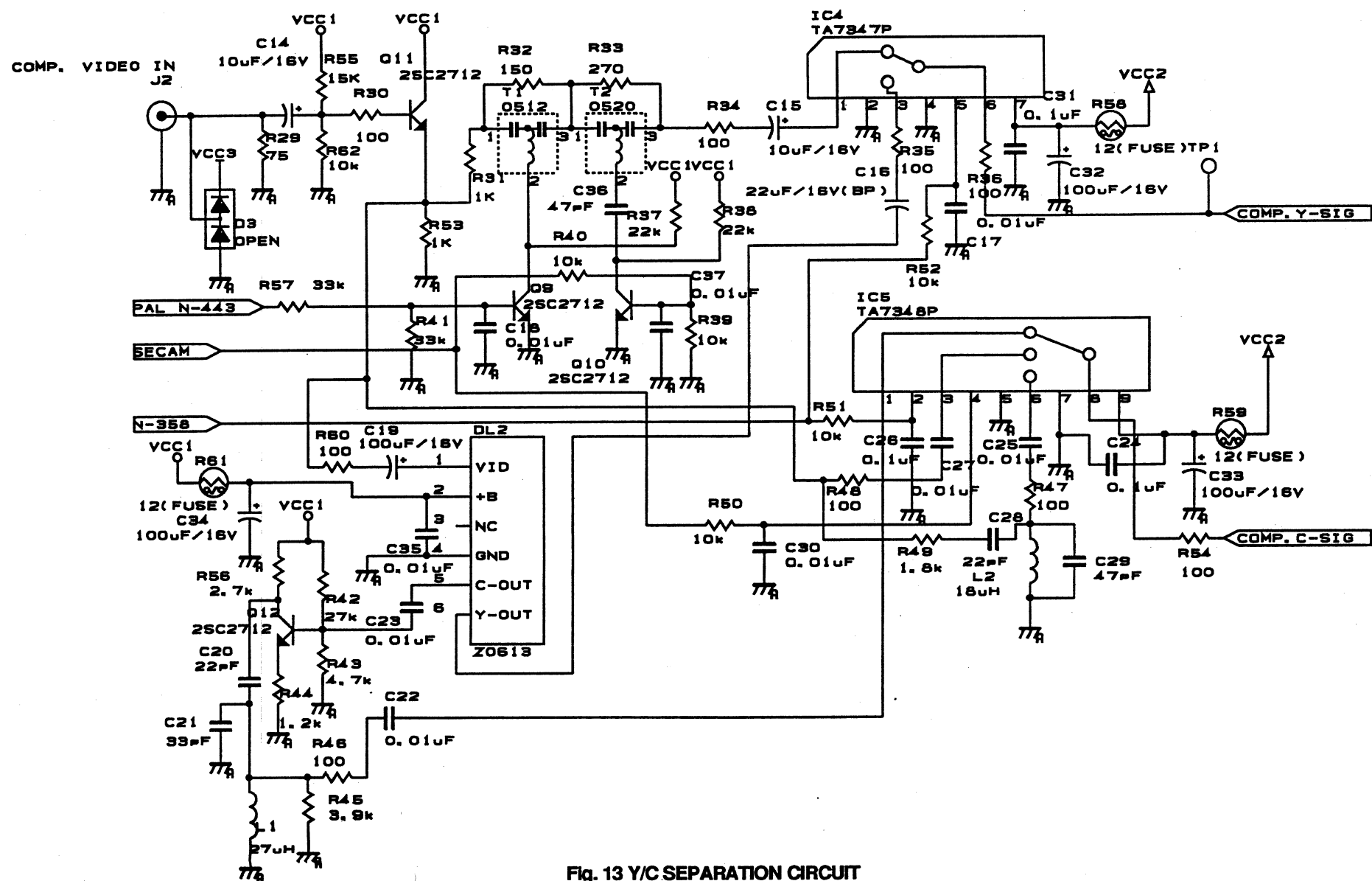


Fig. 13 Y/C SEPARATION CIRCUIT

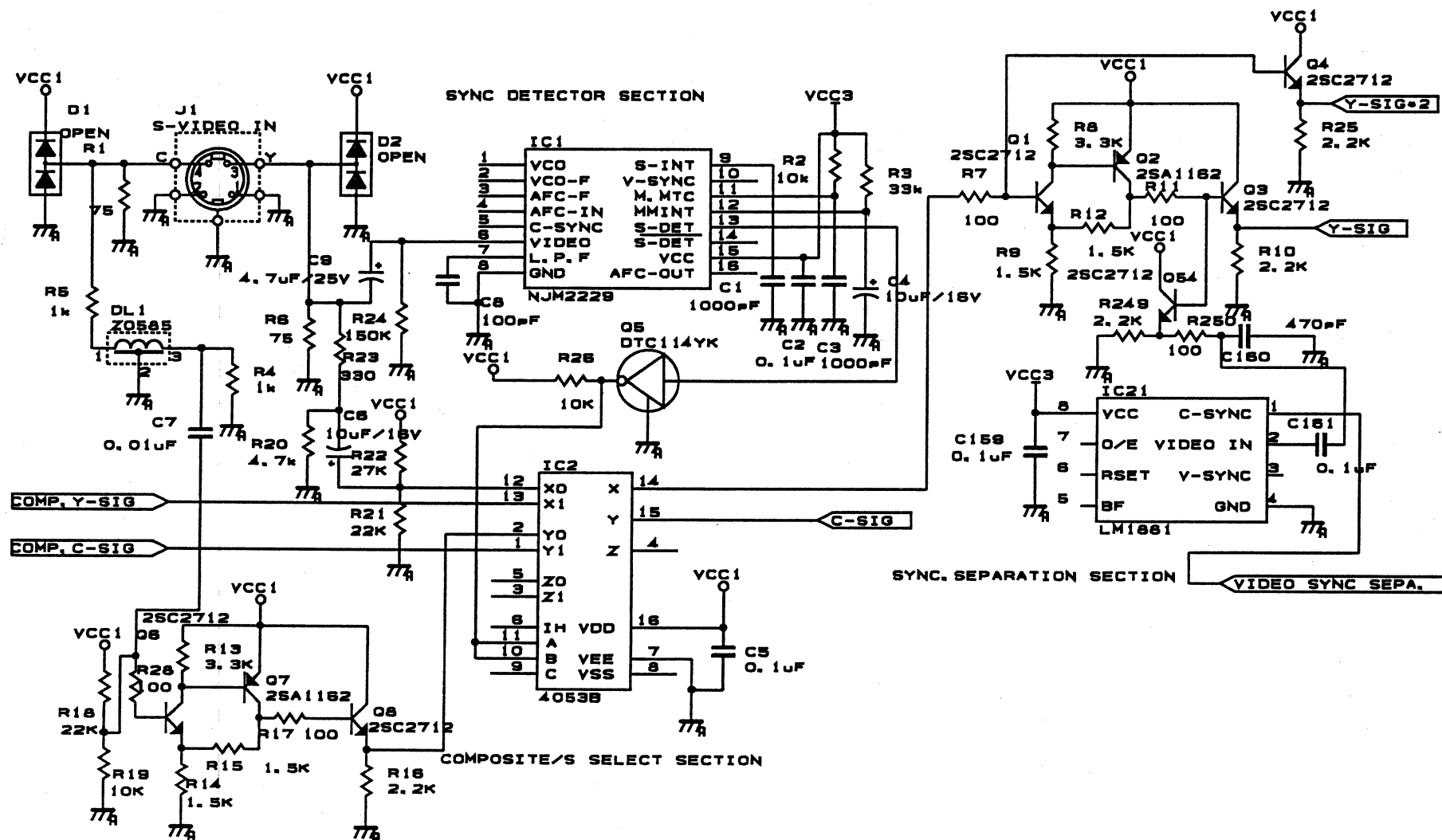


Fig.14 S-VIDEO INPUT AND THE SYNC SEPARATOR CIRCUIT

### 2.1.3.Decoder Circuit

Fig.15 shows Decoder circuit.

The Y-signal described in the preceding paragraph is delayed by DL4 and then inputted to decoder IC16. Also, after the impedance of the Y-signal is converted by Q26, it undergoes differentiation for twice through C84, C85, L9 and R191, and is used as a P-tone signal. The C-signal either is directly inputted to IC16 when it is NTSC or PAL, or passes through bell filter T6 before being sent to IC16 if it is SECAM. These Y- and C-signals are internally converted by IC16 and outputted as Red, Green and Blue signals. These RGB output signals are color-balanced by VR15 and VR16, and then sent to the PC/Video Selector circuit.

IC16 is capable of distinguishing between NTSC, PAL and SECAM types of Y- and C-signals. The 4 types of resulting selector signals (SW2, 50/60, SW3 and #27) are sent to the Microprocessor Block.

**Table 1. DECODER IC16 SELECTOR SIGNAL OUTPUT**

	SW2	50/60Hz	SW3	#27	REMARK
NTSC	L	H	M	VH	VH=approx.10V H=approx.5V MH=approx.4V M=approx.2V L=0V not L=2V or 5V
PAL	not L	L	M	MH	
SECAM	not L	L	M	MH	

T3 adjusts the FM center frequency of the SECAM B-Y axis.

T4 adjusts the FM center frequency of the SECAM R-Y axis.

DL3 and T5 are coupled with delay circuit 1H, and are used for PAL and SECAM chrominance demodulation.

T7 is a oscillator coil used for distinguishing SECAM signal is inputted or not.

IC16 is capable of adjusting the Video Level (the output levels of each channel from the RGB output of IC16), Color, Tint and P-tone using external DC voltage. Video Level is adjusted by VR13(MAIN) and VR18(SUB), Color is adjusted by VR21(MAIN) and VR17(SUB), Tint is adjusted by VR20(MAIN) and VR12(SUB), and P-tone is adjusted by VR14(MAIN) and VR19(SUB).

**Fig. 15 DECODER CIRCUIT**

## **2.2. Personal Computer (PC) Signal Input Circuit**

Fig.16 shows Personal Computer(PC) signal input circuit.

Analog and digital PC RGB signals inputted through the 15-pin D-Sub jack are processed as described below depending on the state of the A/D selector terminal (Grounded when analog, and either N.C. or High when digital).

### **i) Analog Input**

Analog RGB signals are amplified by +6dB by the amplifier made up of Q41 through Q49, either directly or after passing through the analog/digital selector relay RL2. They are then sent to the PC/Video selector.

### **ii) Digital Input**

Digital RGB and r.g.b. signals are sent into the 2-bit x 3-channel D/A converter circuit made up of IC 20 and Q27 through Q32, after being selected by RL2 as described in (i) above, and converted into analog RGB signals. The converted RGB signals are then sent to the PC/Video selector.

H/C-sync and V-sync signals are sent directly to the Sync Separator circuit.

Pin 9 of the 15-pin Mini D-Sub jack is for Macintosh selection. When signals are inputted from an Apple Macintosh, this pin becomes Low, enabling signal reception from same.

## **2.3. Picture Output Circuit**

Fig.17 shows Picture Output circuit.

The composite or S-Video, or the analog or digital PC signals are selected and sent to the TFT Module along with the necessary H/C-sync and V-sync signals.

### **2.3.1. Video/PC Select Circuit**

Composite/S-Video, and analog/digital PC RGB signals are inputted to IC17 and IC18. Video/PC selector switch, and the external PC/Video selector signal and analog/digital selector signal from the D-Sub 15-pin jack, Q40, Q34, Q53 and Q50 decide the relevant video signal in IC17 and 18 after passing through.

### **2.3.2. Sync Signal Output Circuit**

H/C-sync and V-sync signals of video or PC are strengthened by the Schmitt trigger in IC14. The Sync Selector IC15 then selects the necessary PC or video sync signals and sends them through CN11 to the TFT Module.

### **2.3.3. Output Driver Circuit**

The selected RGB signals (described in paragraph 3.1) are converted to an impedance of  $75\Omega$  by Q35 through Q37, and sent to the TFT module.





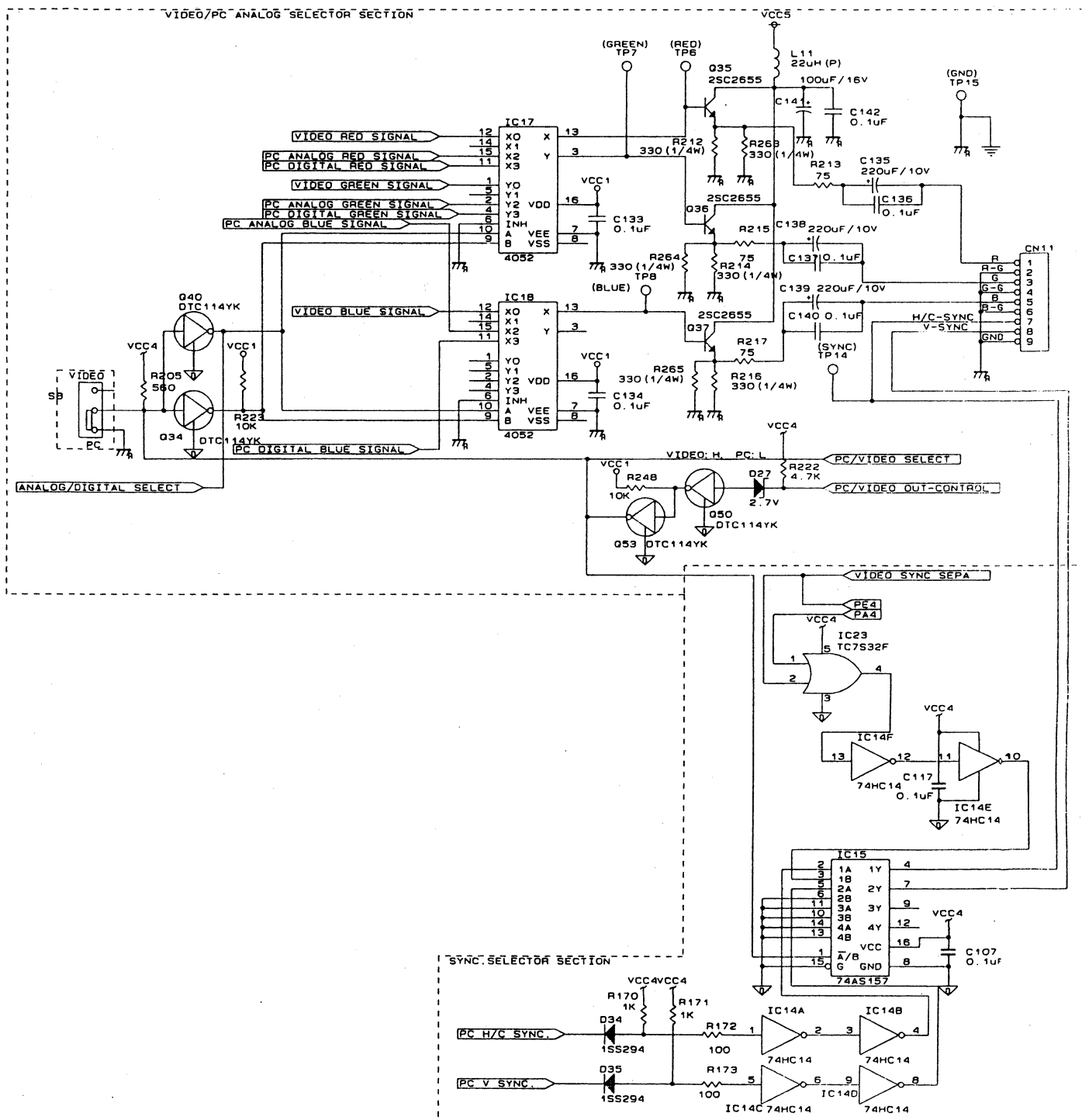


Fig. 17 PICTURE OUTPUT CIRCUIT

## 2.4. Power Supply Circuit

Fig.27 shows Power Supply Circuit.

The QD-100MM operates from a 12.9V (actually 12.2V to 14.2V) AC adapter power supply.

The power is switched on and off by a relay(RL1), which is in turn controlled by not only the main Power switch but also external on/off control, a thermal protector that detects malfunctions in the backlight, a reverse-polarity protection circuit and a surge protection circuit (shuts off at approx. 16V).

The power voltage which passes through the relay is supplied to the following circuits:

- 1) The inverter circuit board (direct)
- 2) +5V circuit: Power is converted by DC-DC converter CON1 to approximately 5.5V and is then regulated by the 4-pin regulator IC12 to +5V.
- 3) +12V circuit: Power is regulated by the 4-pin regulator IC13 to +11.75V. Fine adjustments are made by VR7
- 4) +9V circuit: Power is regulated by the 3-pin regulator IC10 to approximately +9V.
- 5) Other power supplies: Power supplies of +5V each are produced by IC11 for the power control and IC22 for the Microprocessor Block.

## 2.5. Power-up and down Sequence

The Power-up and down sequence of the QD-100MM is controlled by IC7 (microprocessor) in the following way.

- 1) When main power is switched on, the LCD Module power-up sequence is executed.
  - +5V: Switches on approx. 170 ms after main power is switched on. (PB7 L-->H)
  - +12V: Switches on approx. 300 ms after main power is switched on. (PD0 L-->H)
- 2) When main power is switched off, or during momentary voltage dip, the LCD Module Power-down sequence is executed.

If DC input from the AC adapter falls to 9.5V or lower, the +12V supply is switched off by IRQ interruption signal. If the +5V supply does not drop within one second of this, the main program is re-executed from the start and the +12V supply is re-established after 300 ms. If the +5V supply falls to 4.2V or lower within the above-mentioned one-second period the Reset sequence is activated.

If a momentary power failure (the +5V supply falls to 4.2V or lower) is detected, the Reset sequence is activated similarly and the Power-up sequence is re-executed.

## 2.6. Microprocessor Block

Fig.26 shows Microprocessor Circuit.

The Microprocessor Block controls the various functions of the display monitor and makes the appropriate settings. It has the following functions:

- (1) Control of the power-up sequence described in paragraph 2.5.
- (2) PC/Video mode selection

The Microprocessor Block distinguishes whether the incoming signal is a video signal or a personal computer (RGB) signal.

PD4 (P/V SEL) = H --> Video mode  
                  = L --> PC mode

- (3) Signal differentiation and decoder settings when in video mode

The Microprocessor differentiates between each mode when in video mode.

- |                      |                              |
|----------------------|------------------------------|
| 1. 3.85MHz NTSC mode | 4. SECAM mode                |
| 2. 4.43MHz NTSC mode | 5. Monochrome NTSC mode      |
| 3. PAL mode          | 6. Monochrome PAL/SECAM mode |

It sends the appropriate signals to the video decoder and makes the appropriate settings to the LCD module according to inputted above video signals. (See Fig. 11)

It also detects the presence or absence of a composite sync signal (H-sync), and sets the composite sync signal to the LCD module to "H" if there is no sync signal present.

(4) Differentiation between the type of computer connected when in PC mode

When in PC mode, the Microprocessor Block measures the period of the incoming horizontal sync signal and sets the parameters of the LCD module appropriately. However, in VGA mode the period of the horizontal sync signal is the same for 480-, 400- and 350-line modes; therefore the polarities of horizontal sync signal and period of vertical sync signal are used for distinguishing between signal types.

(5) Key-input distinguishing and LED displaying

In PC mode, pressing the "SEL" button toggles through each mode and lights the appropriate LED.

- a) "H-POS" : Horizontal position
- b) "V-POS" : Vertical position
- c) "PHASE": Phase
- d) "FREQ" : Frequency

The UP and DOWN keys have the following functions.

MODE	UP key	DOWN key
H-POS	Moves the image right	Moves the image left
V-POS	Moves the image up	Moves the image down
PHASE	Adjusts the sampling point for each pixel to backward	Adjusts the sampling point for each pixel to forward
FREQ	Adjusts the sampling frequency of the image data to higher	Adjusts the sampling frequency of the image data to lower

When in Video mode, the UP and DOWN keys are fixed in "H-POS" mode.

## 2.7.Audio Circuit

Fig.18 shows Audio Circuit.

Audio signals inputted through the audio jack pass through the analog on/off switch in IC2 and then are amplified by IC9 and outputted to the speaker. Audio volume is controlled by VR1. Audio on/off switching is done by the selection of PC/Video switch or by the external control.

**Table 2 SOUND CONTROL FUNCTIONS**

		EXTERNAL AUDIO CONTROL	
		HIGH	LOW
MODE	PC	SOUND OFF	SOUND OFF
	VIDEO	SOUND ON	SOUND OFF

## 2.8.External Control

Fig.19 shows External Control Circuit.

Operation of the QD-100MM can be controlled in the following ways by connecting the external control to the external control terminal:

- 1) Power on/off
- 2) Audio output on/off
- 3) Switching between PC and Video modes

Controlling is done at the TTL level.

**Table 3 EXTERNAL CONTROL FUNCTIONS**

		CONTROL INPUT		REMARK
		H	L	
TERMINAL NAME	POWER ON/OFF	POWER ON	POWER OFF	Main power switch should be set to OFF.
	PC/VIDEO	VIDEO	PC	PC/VIDEO switch should be set to VIDEO.
	SOUND ON/OFF	See Table 2		

## 2.9.Picture Control Circuit

Fig.20 shows Picture Control Circuit.

The RGB signals outputted from the main circuit board are inputted to the 3-channel video amp on the TFT module. Here the Brightness, Contrast, etc. are controlled, but DC voltage must be added for these controls. VR3, VR4, VR5 and VR26 through VR29 adjust the amount of DC voltage for the controls.

**Table 4 PICTURE CONTROL FUNCTIONS**

VR	FUNCTION	REMARK
VR3	Sub-brightness control	Control the DC level of the picture
VR4	Brightness control	
VR5	Contrast control	Controls the picture AC gain
VR26,27	Control Red and Blue gains respectively	White balance adjustments
VR28,29	Control Red and Blue DC levels respectively	

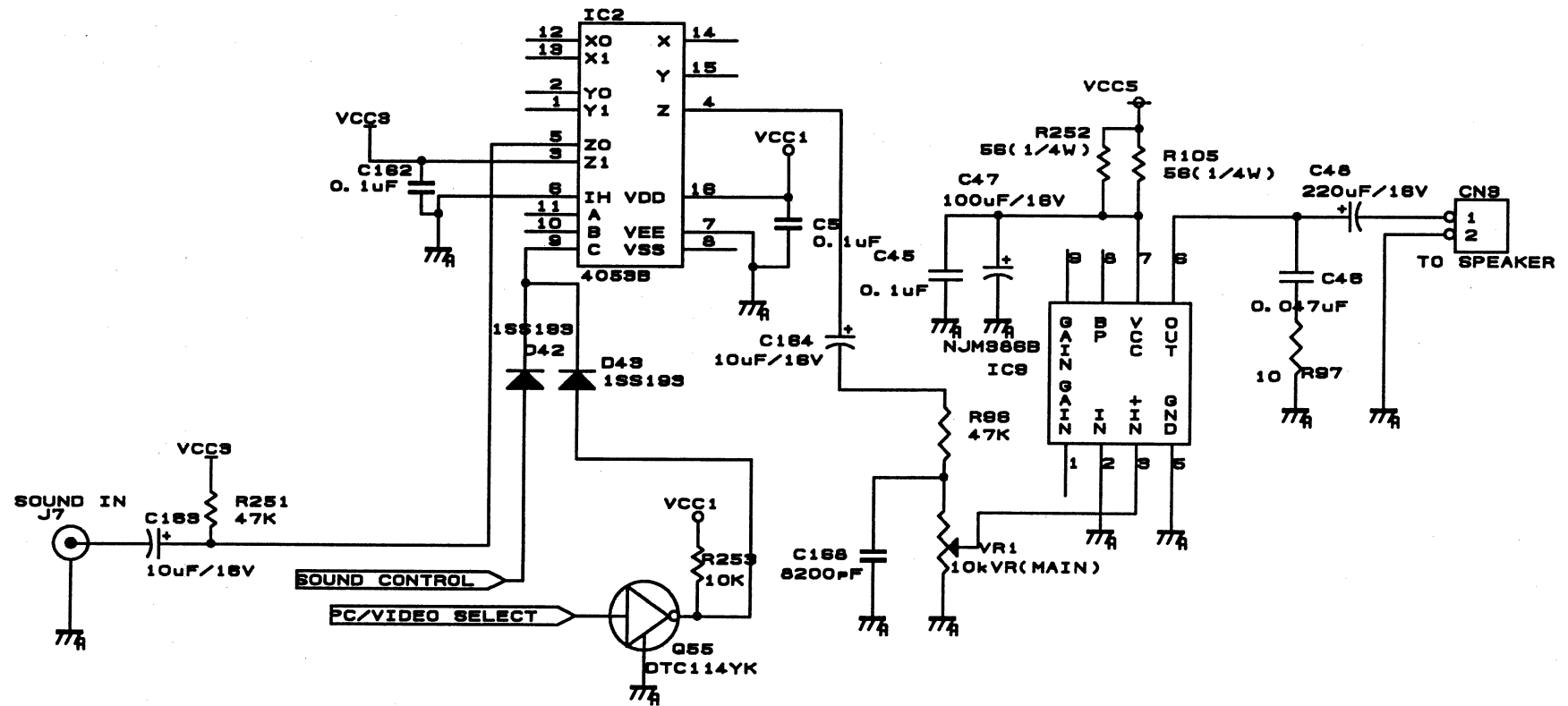


Fig.18 AUDIO CIRCUIT

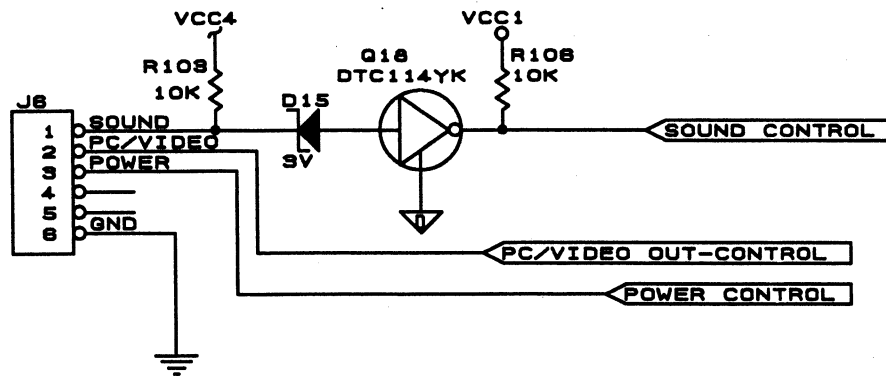


Fig.19 EXTERNAL CONTROL CIRCUIT

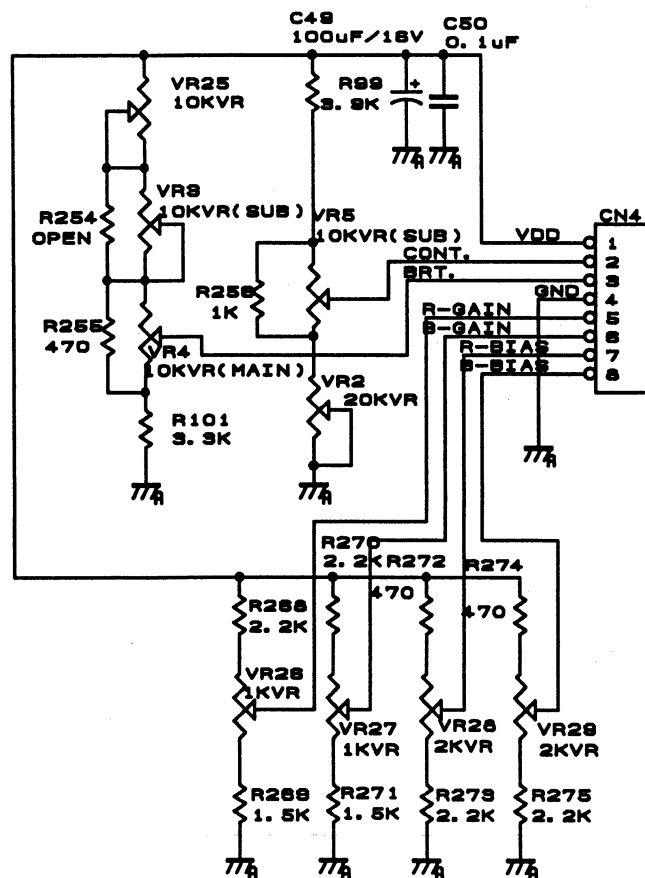


Fig.20 PICTURE CONTROL CIRCUIT

### 3.INVERTER CIRCUIT BOARD

The Inverter circuit board supplies the high voltage AC to the four hot-cathode fluorescent tubes used as backlight illumination for the TFT panel, using the voltage from the AC adaptor directly.

Inverter Circuit board can not be replaced. It needs to be replaced when it is failed.

### 4.BACKLIGHT UNIT

The backlight unit is comprised of four hot-cathode fluorescent tubes, and is attached to the TFT panel by screws. The fluorescent tubes are driven by high-voltage AC from the Inverter unit. Also, there is a built-in thermal protector which detects excessive heat from the hot-cathode fluorescent tubes. (This is more likely to be activated toward the end of the life span of the fluorescent tubes.)

Backlight unit can not be replaced. It needs to be replaced when fluorescent tube or other circuit is failed.

### 5.TFT MODULE

#### 5.1.Description of operation

The TFT Module receives analog RGB, and H/C- and V-sync signals from the main circuit board, and displays them as images on the liquid crystal display.

The TFT Module is controlled by control signal and flag signal data exchange through CN1 and CN2. It receives its +5V and +12V power supplies through CN6.

The output names of each connector are as shown in the following tables.

TFT module can not be replaced. It needs to be replaced when it is failed.

**Table 5**

CN6 : POWER SUPPLY CONNECTOR		
PIN NUMBER	PIN NAME	FUNCTION
1	+12V	+12V supply
2	+5V	+5V supply
3	GND	Ground terminal

**Table 6**

CN4 : PICTURE CONTROL CONNECTOR		
PIN NUMBER	PIN NAME	FUNCTION
1	Vdd	+12V supply
2	CONT.	Picture AC level control
3	BRT.	Picture DC level control
4	R-GAIN	RED-picture gain control
5	B-GAIN	BLUE-picture gain control
6	R-BIAS	RED-picture bias control
7	B-BIAS	BLUE-picture bias control
8	GND	Ground terminal



**Table 7**

CN1 : FLAG SIGNAL CONNECTOR			
PIN NUMBER	PIN NAME	FUNCTION	I/O
1	V-FLG	Video C-sync flag	O
2	P-FLG	PC H-sync flag	O
3	VSC	PC V-sync flag	O
4	C256HS	Horizontal sync signal divided by 256 pulse output	O
5	HPOL	PC H-sync polarity	O
6	VPOL	PC V-sync polarity	O
7	GND	Ground terminal	-

**Table 8**

CN2 : CONTROL SIGNAL CONNECTOR			
PIN NUMBER	PIN NAME	FUNCTION	I/O
1	KD0	Resister setting address/data input(LSB)	I
2	KD1	Resister setting address/data input	I
3	KD2	Resister setting address/data input	I
4	KD3	Resister setting address/data input	I
5	KD4	Resister setting address/data input	I
6	KD5	Resister setting address/data input	I
7	KD6	Resister setting address/data input	I
8	KD7	Resister setting address/data input(MSB)	I
9	MCK	Resister setting clock	I
10	MAC	Macintosh II C-sync designation	I
11	PVSELV	PC/VIDEO switching	I
12	N.C.		I
13	GND	Ground terminal	-
14	N.C.	+5V output	-

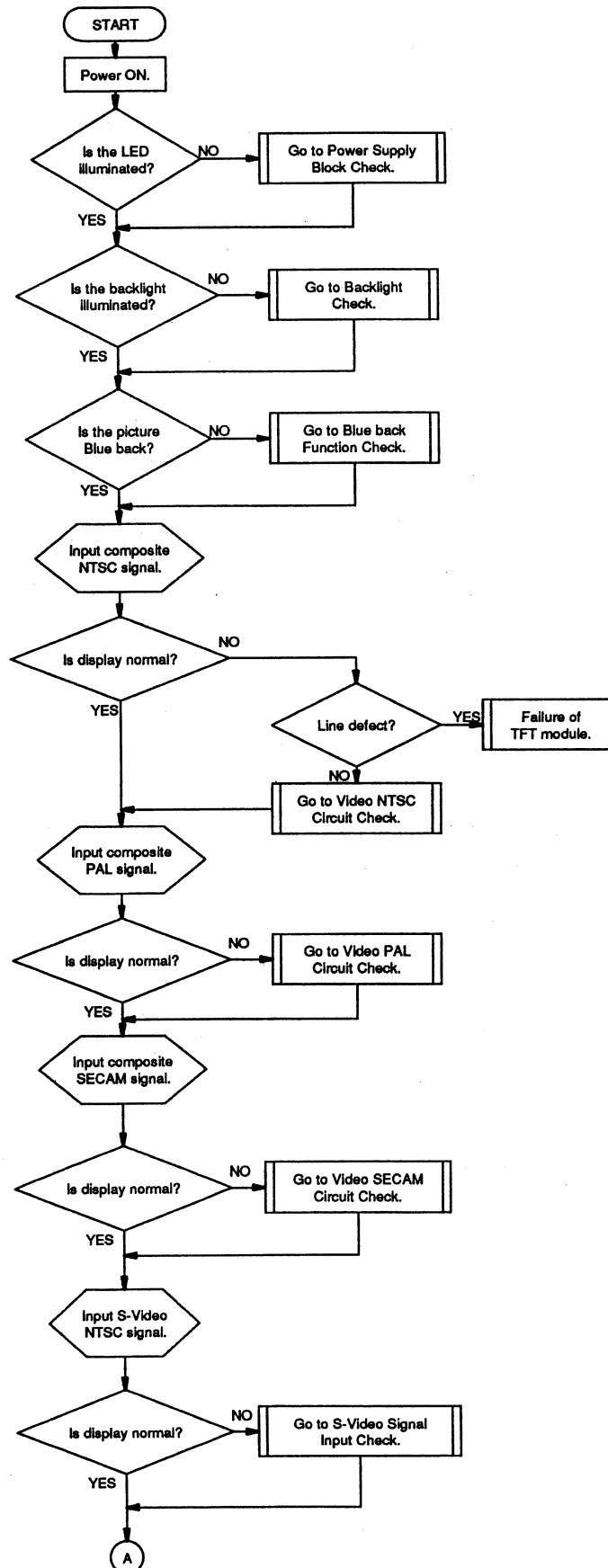
**Table 9**

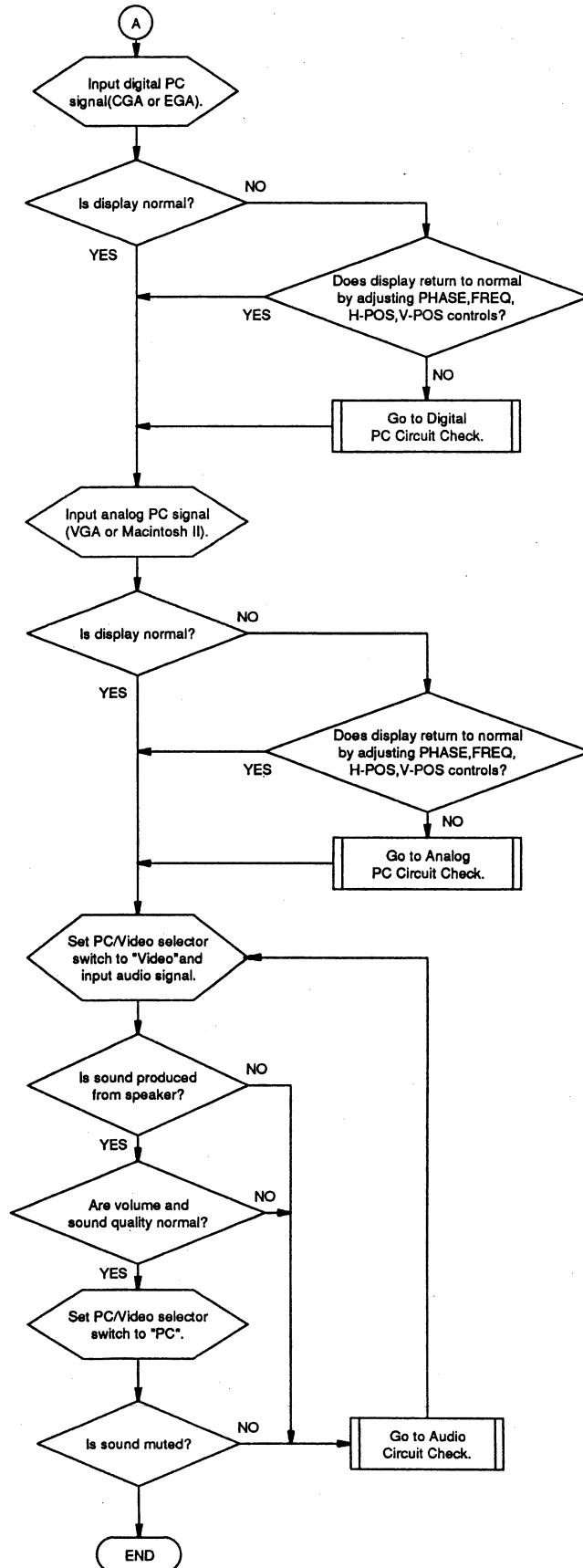
CN11 : PICTURE OUTPUT CONNECTOR		
PIN NUMBER	PIN NAME	FUNCTION
1	RED	Red picture signal
2	GND	Ground terminal
3	GREEN	Green picture signal
4	GND	Ground terminal
5	BLUE	Blue picture signal
6	GND	Ground terminal
7	H/C-SYNC	Horizontal/Composite-sync signal
8	V-SYNC	Vertical sync signal
9	GND	Ground terminal

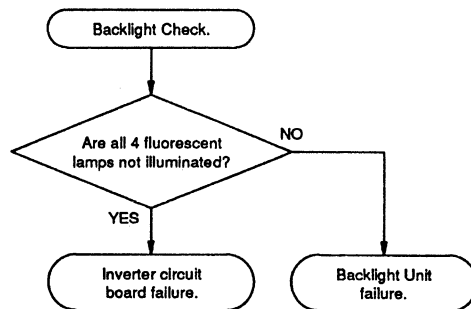
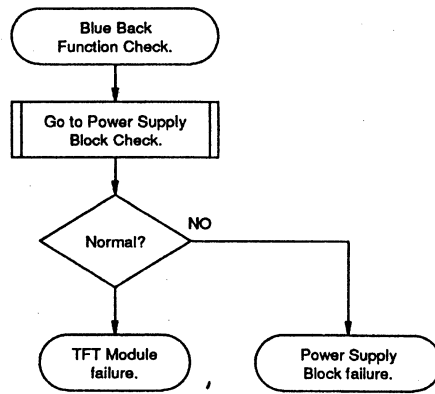
**5.2.Cautions for handling the TFT module**

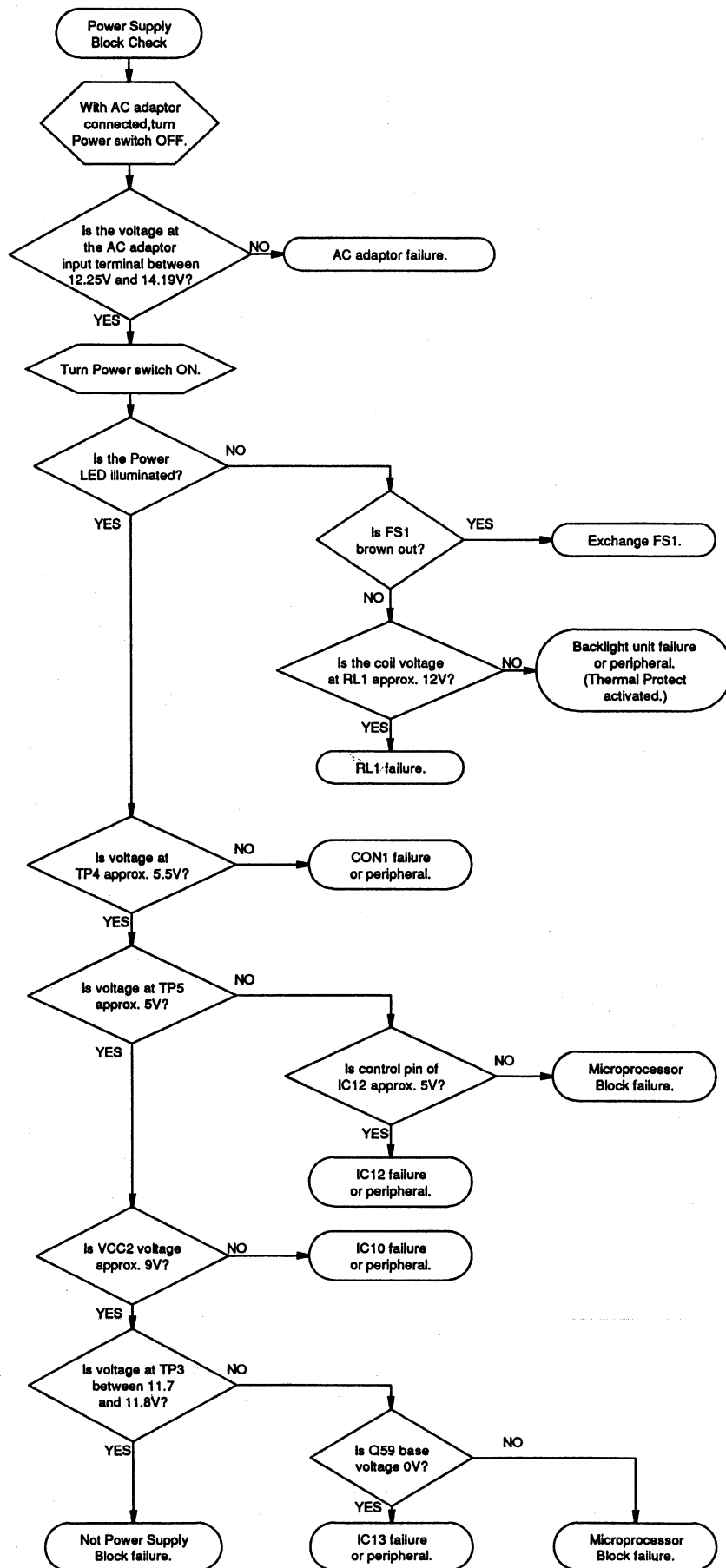
- (1) The TFT module is extremely finely and densely constructed, and should NEVER be disassembled.
- (2) Be very careful when handling the deflector plate as it is easy to scratch.
- (3) To remove dust or dirt from the front of the TFT panel, wipe it gently with cotton wool or a soft cloth. When removing dust with compressed air, please use a filter.
- (4) Care must be taken not to allow water droplets to remain on the surface of the TFT panel for an extended period, as the panel may discolor or stain.
- (5) The TFT panel is made of glass. Therefore, it could become damaged or break if it collides with a hard object or is dropped. Please handle it carefully.
- (6) C-MOS LSI circuits are used in the TFT module, and so it is very sensitive to static electricity. It is therefore essential that service personnel use conductive mats and grounded wrist straps when servicing this device.

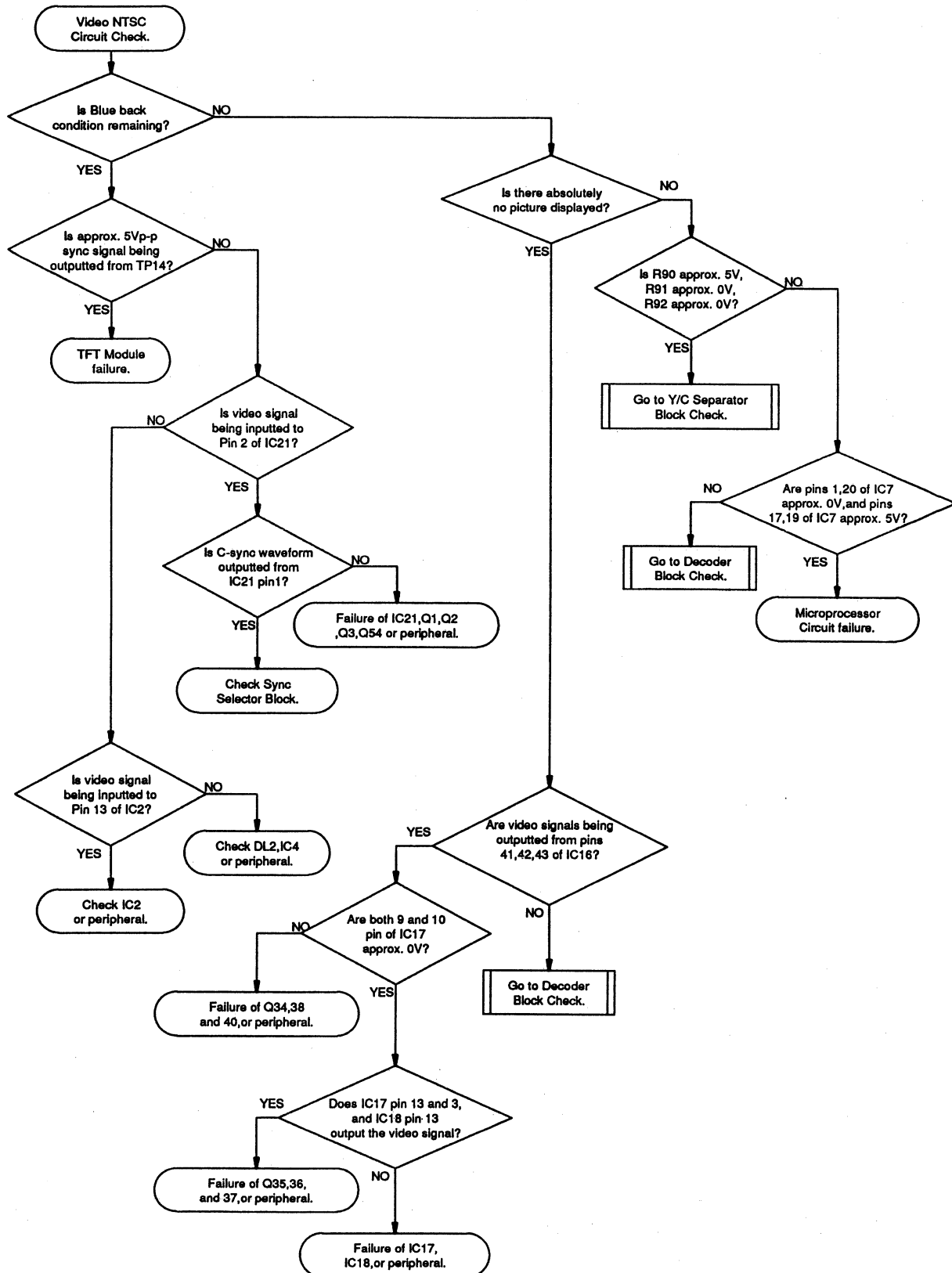
# TROUBLESHOOTING CHART

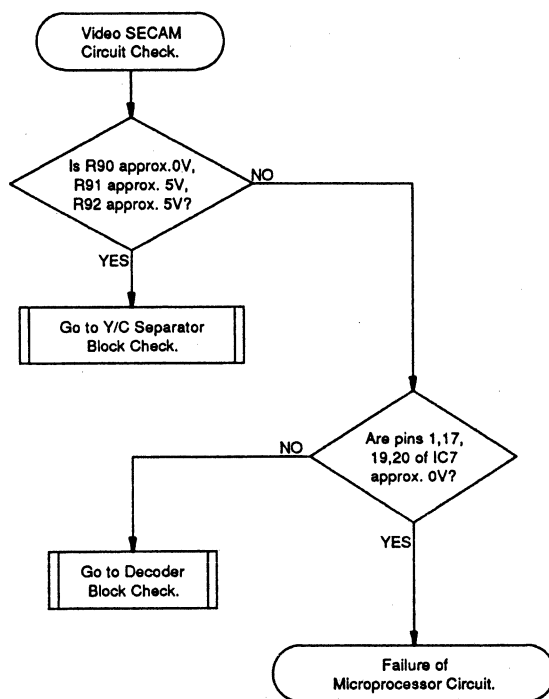




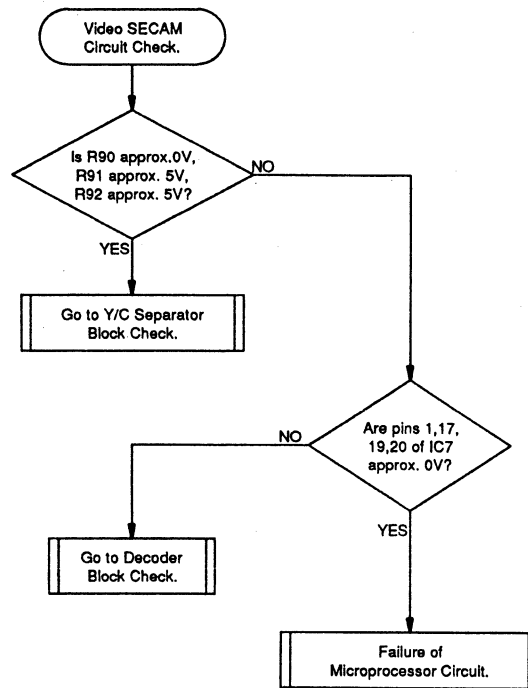


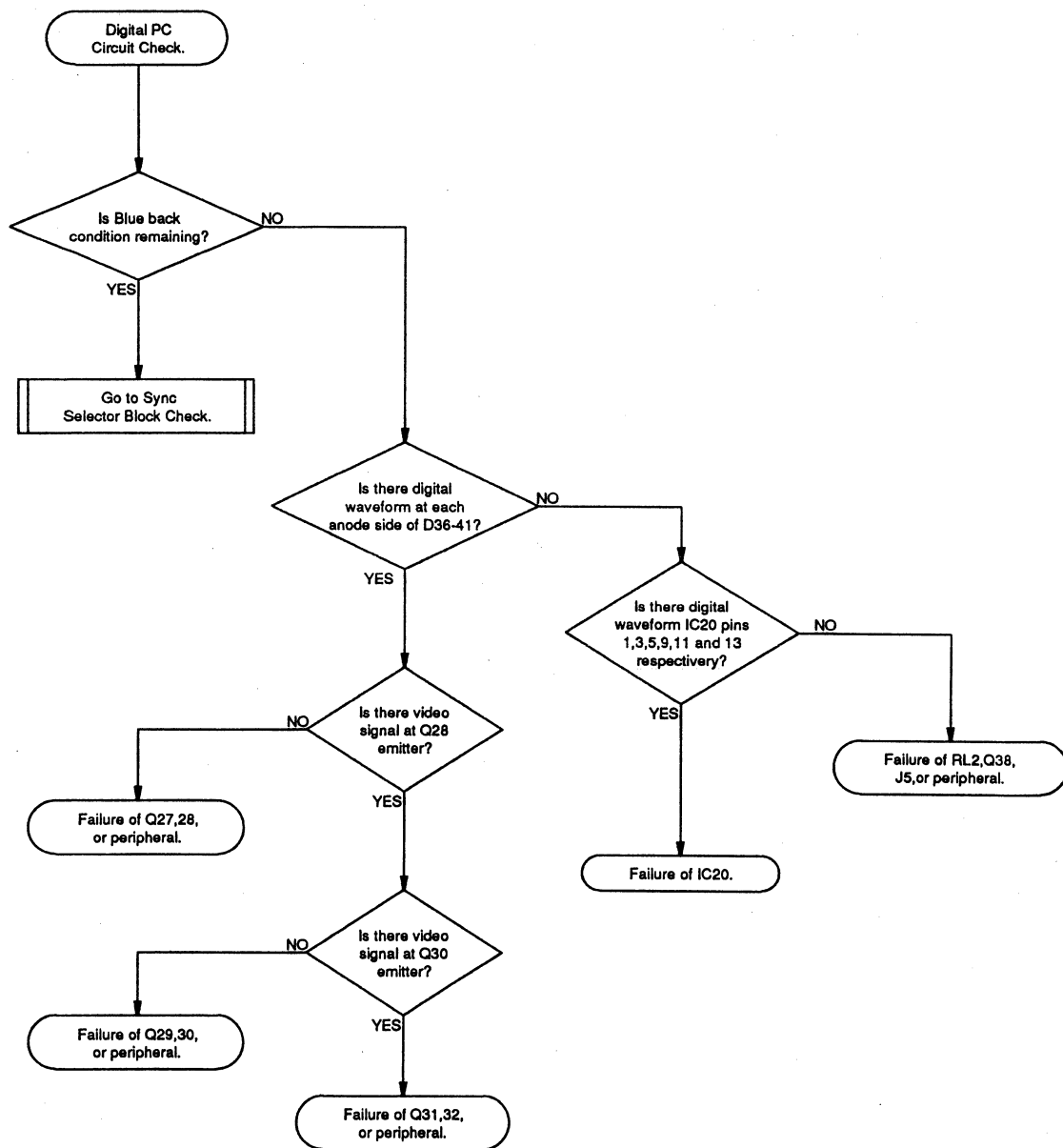


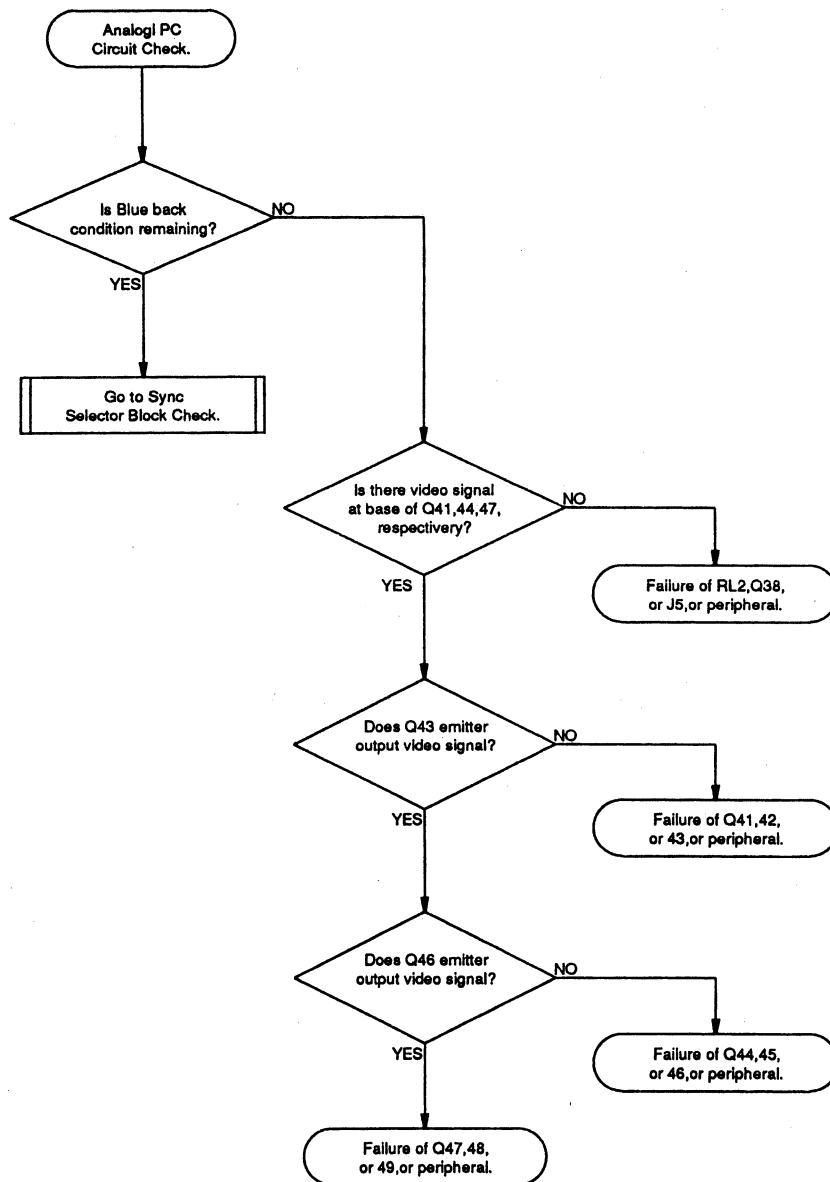


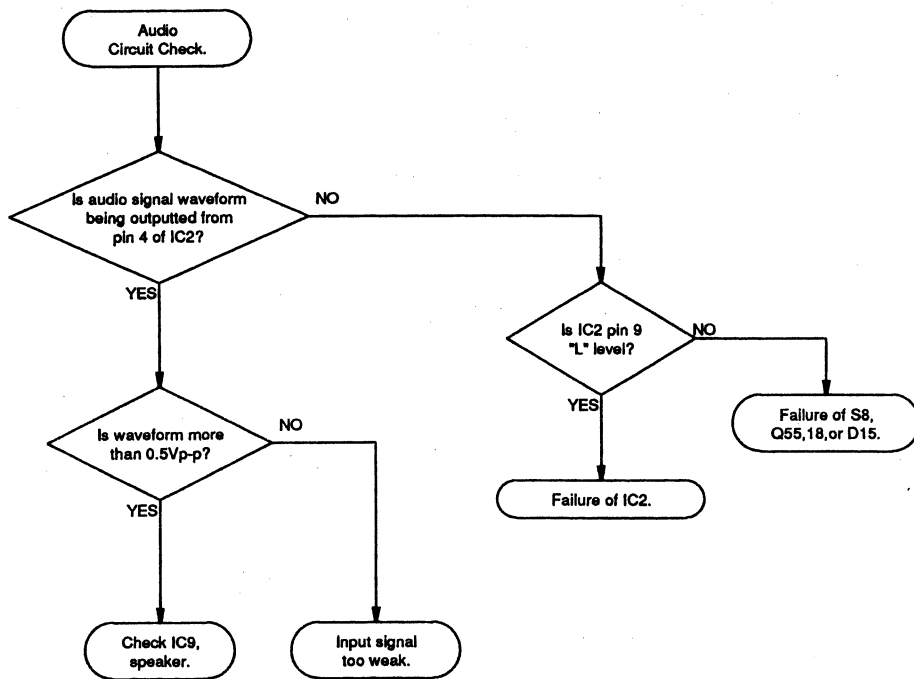


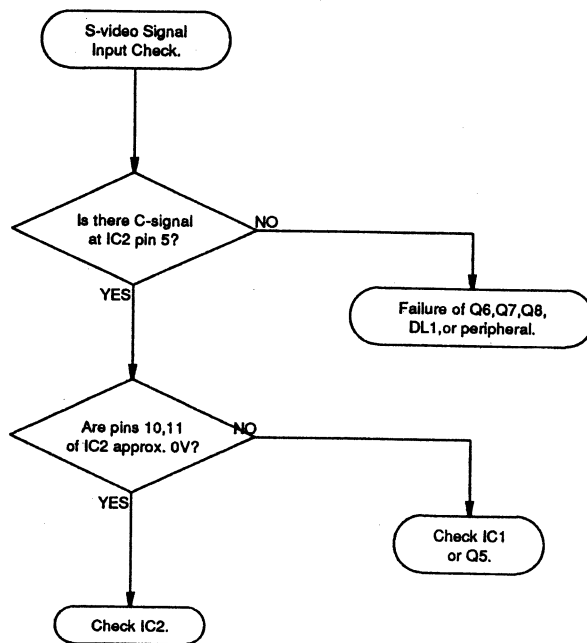


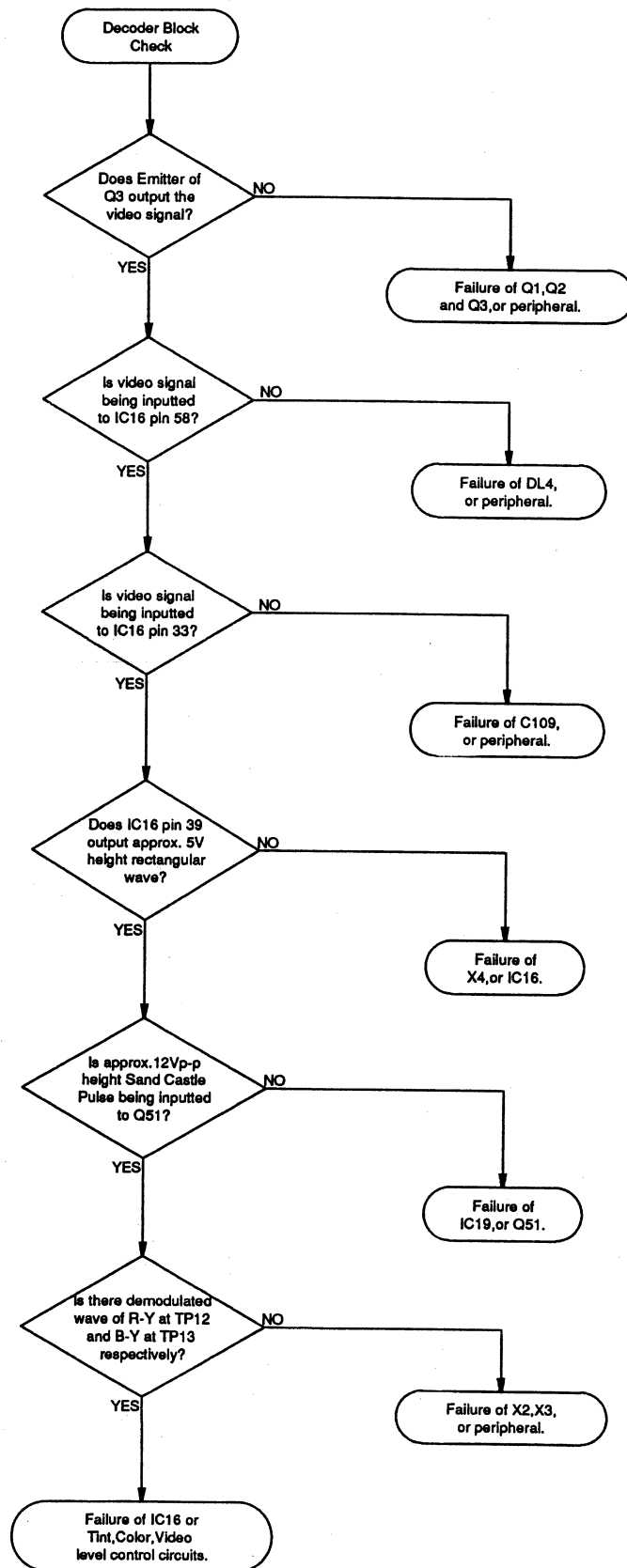


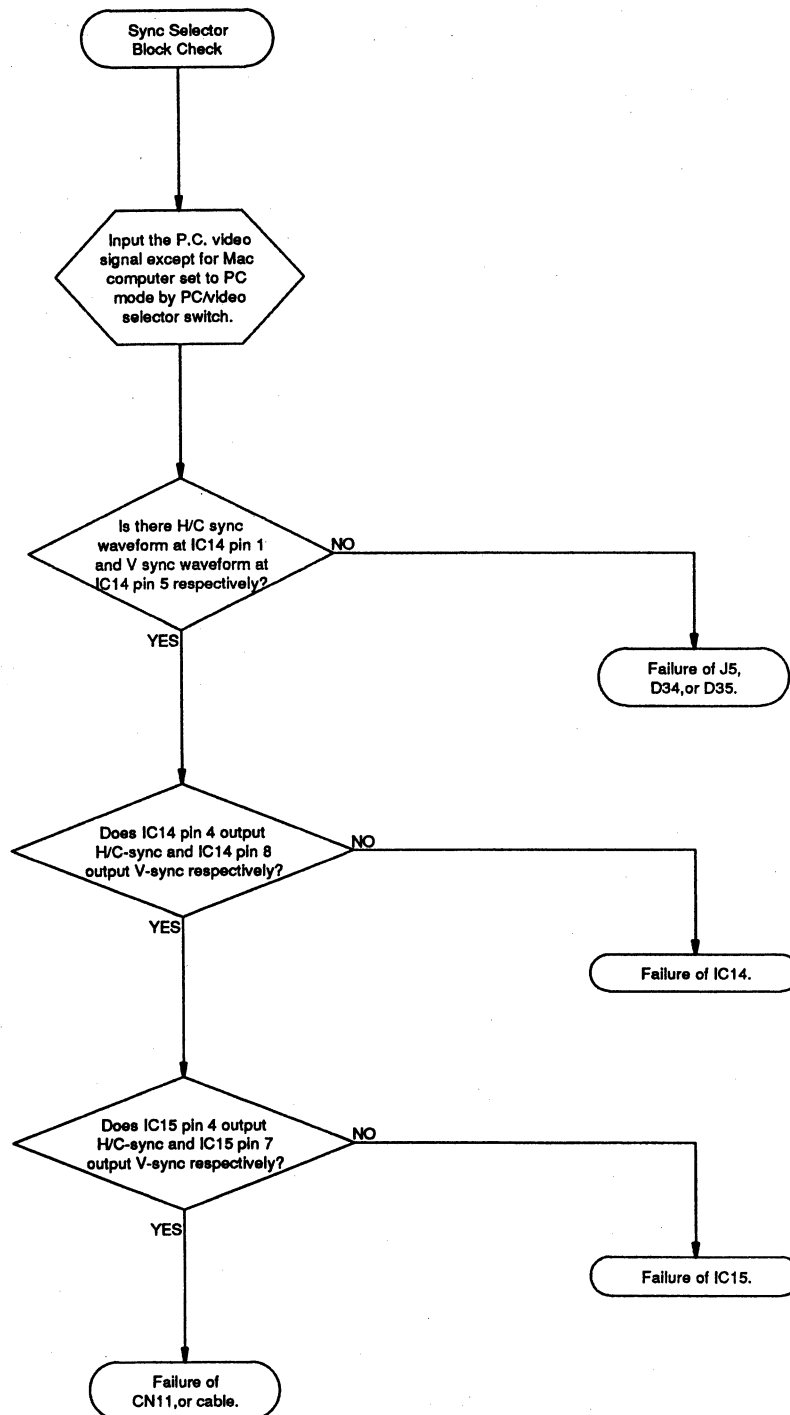


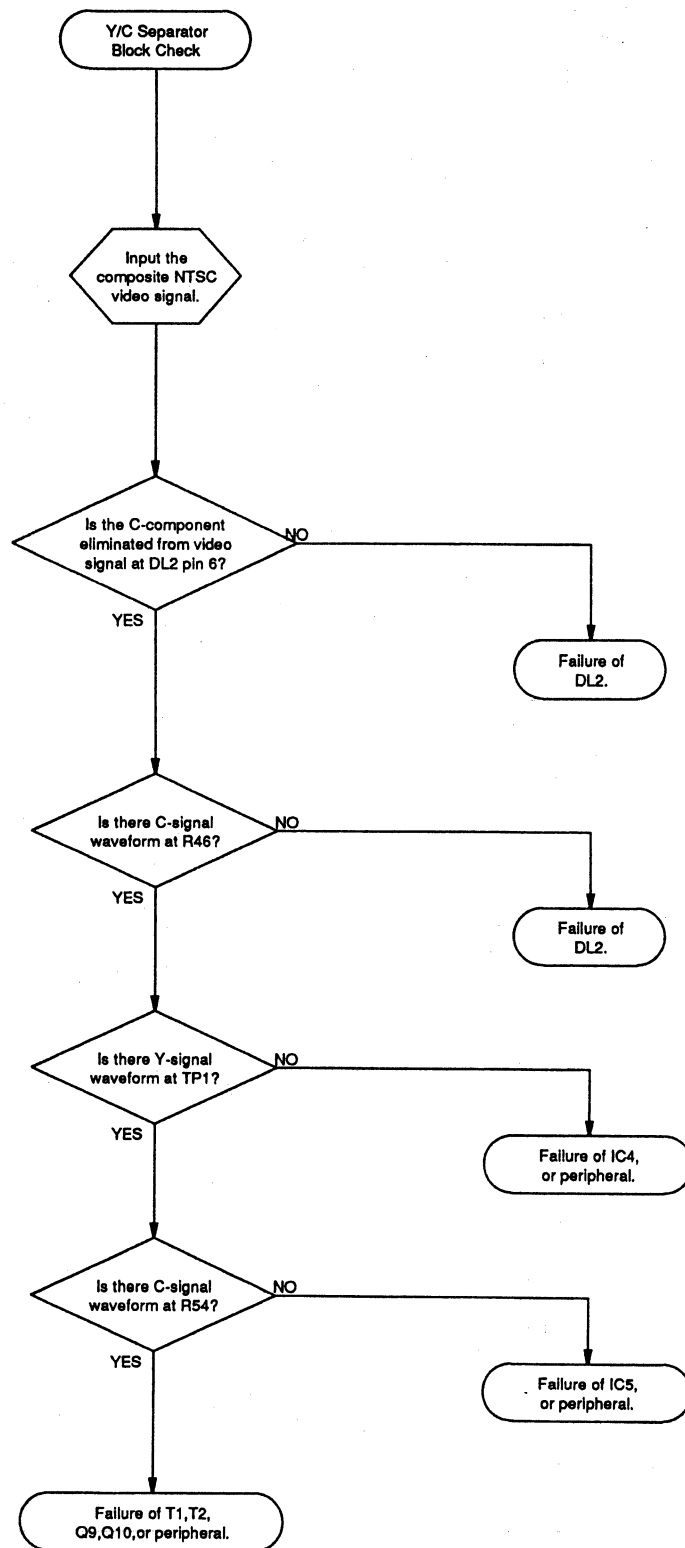






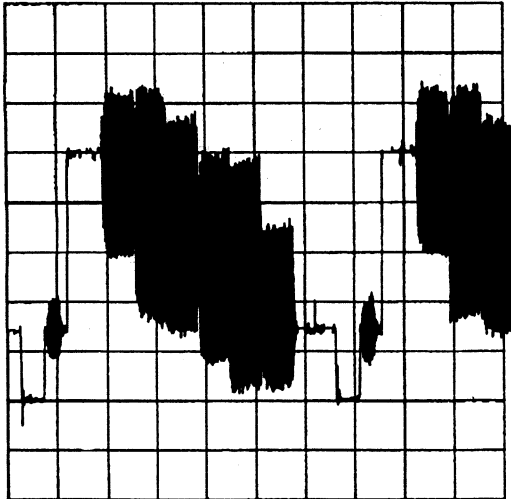






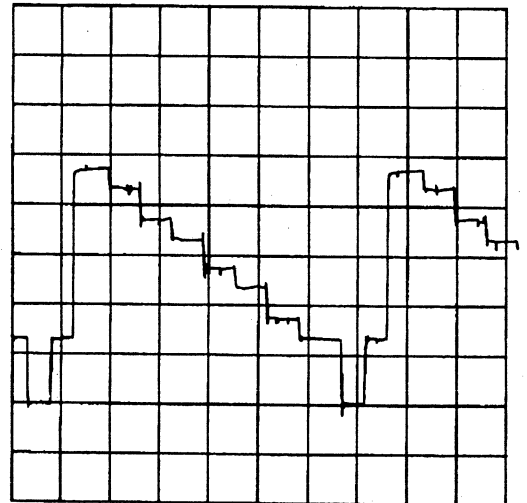


## SIGNAL WAVEFORM



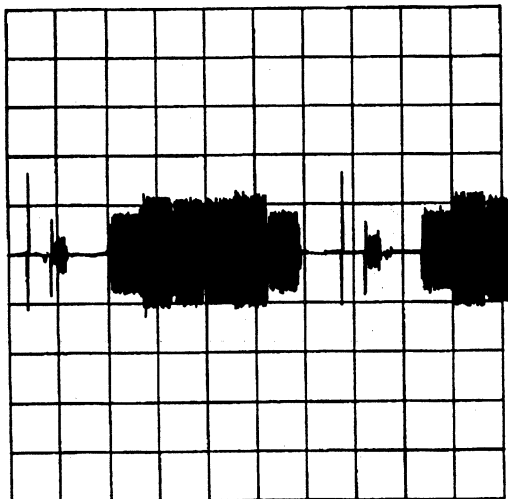
J2 <0.5V/div, 20  $\mu$ sec/div>

Fig.21-A



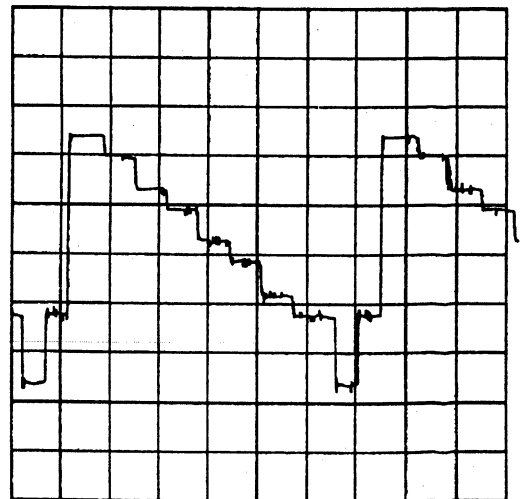
TP1 <0.5V/div, 20  $\mu$ sec/div>

Fig.21-B



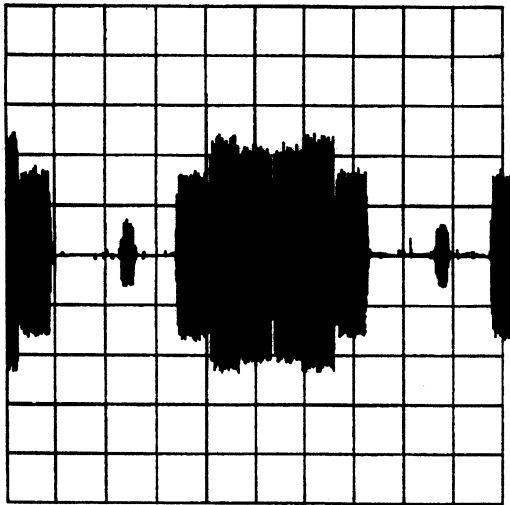
IC2-1pin <0.1V/div, 20  $\mu$  sec/div>

Fig.21-C



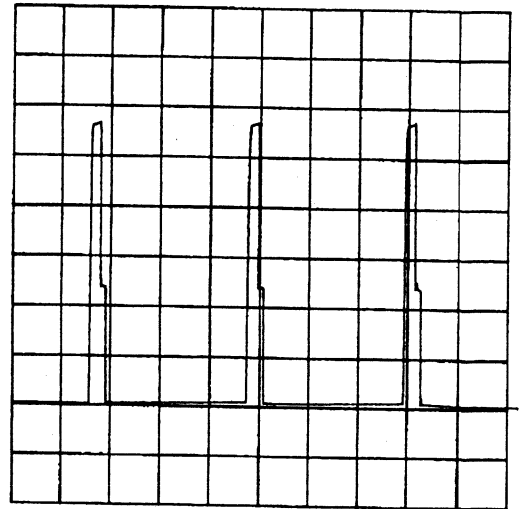
J1-3pin <0.5V/div, 20  $\mu$ sec/div>

Fig.21-D



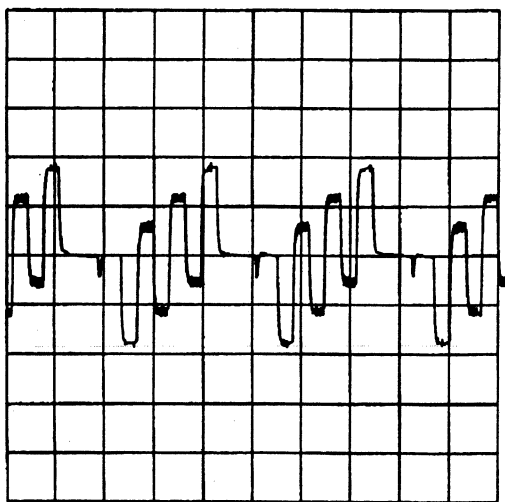
J1-4pin <0.5V/div, 20  $\mu$  sec/div>

Fig.21-E



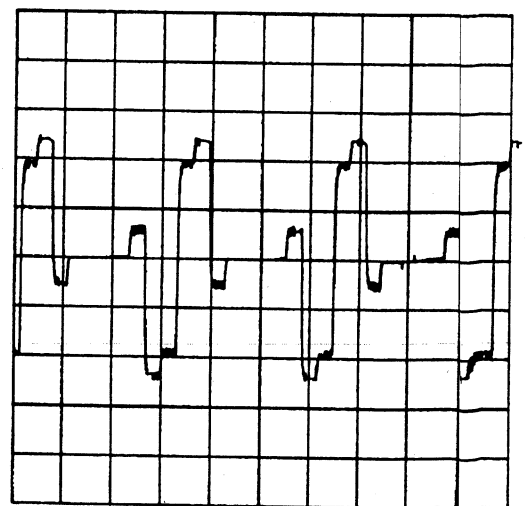
IC16-35pin <5V/div, 20  $\mu$  sec/div>

Fig.21-F



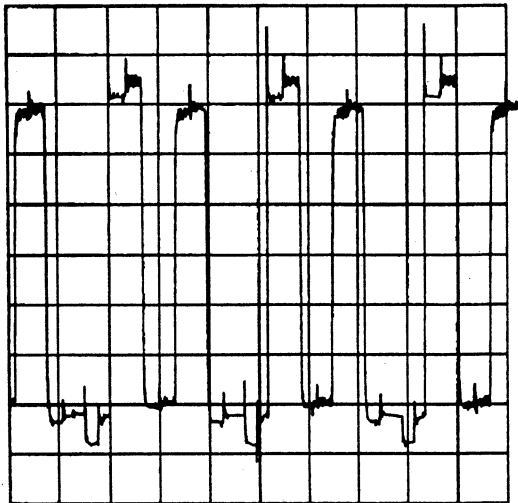
TP12 <0.5V/div, 20  $\mu$  sec/div>

Fig.21-G

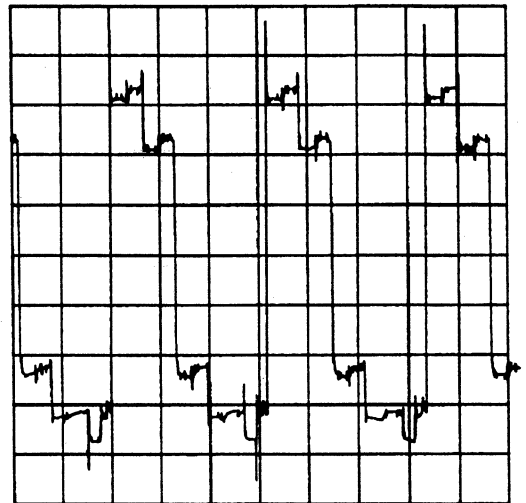


TP13 <0.5V/div, 20  $\mu$  sec/div>

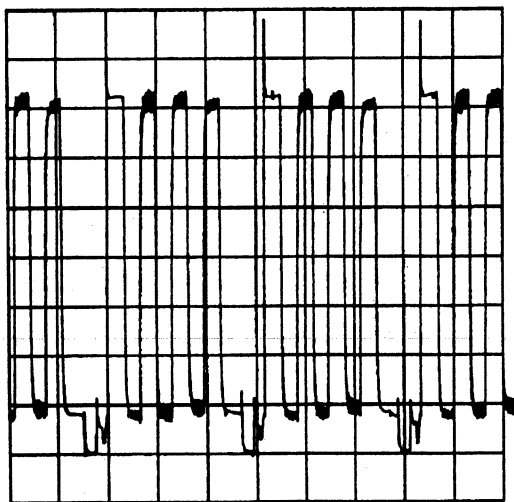
Fig.21-H



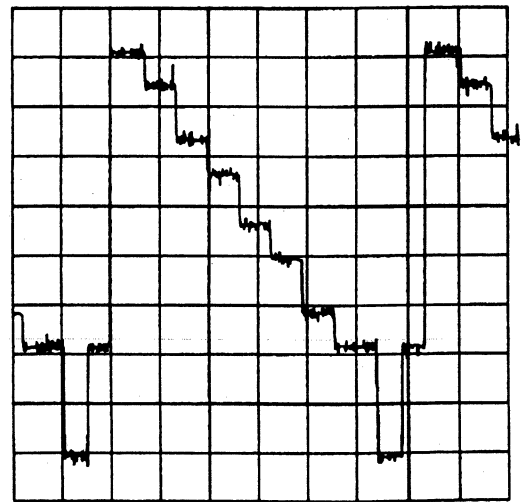
TP6 <0.5V/div,20  $\mu$ sec/div>  
Fig.21-I



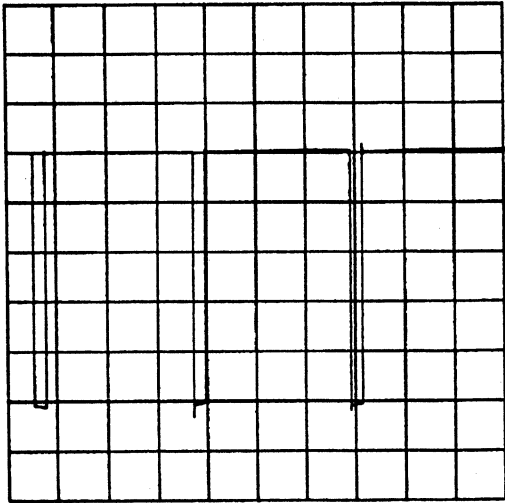
TP7 <0.5V/div,20  $\mu$ sec/div>  
Fig.21-J



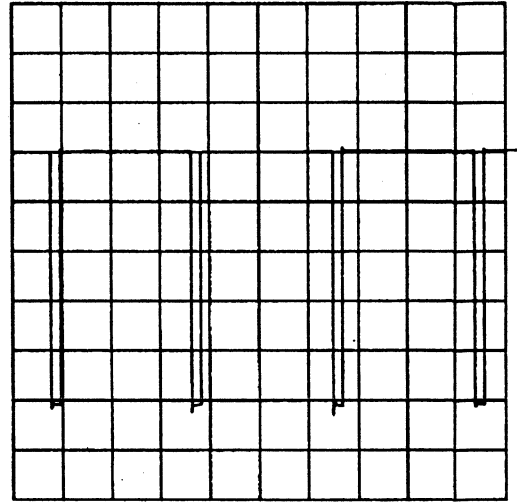
TP8 <0.5V/div,20  $\mu$ sec/div>  
Fig.21-K



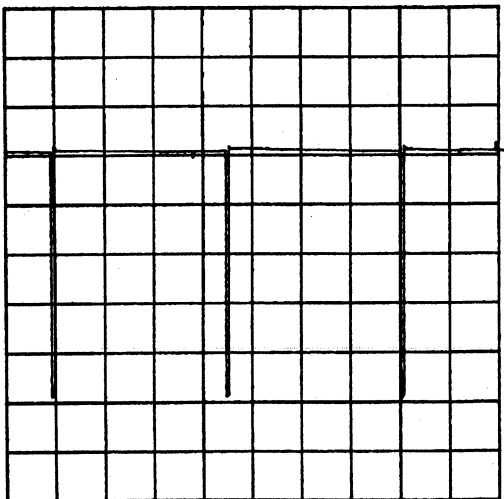
IC16-58pin <0.1V/div,20  $\mu$ sec/div>  
Fig.21-L



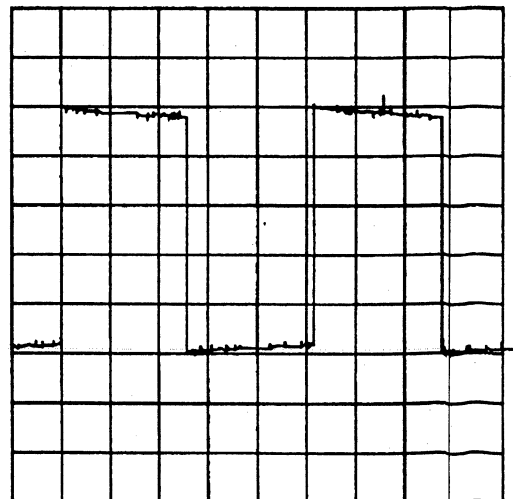
IC21-1pin, IC15-3pin, TP14  
 <5V/div, 20  $\mu$ sec/div>  
 Fig. 21-M



J5-13pin, IC15-2pin, TP14  
 <5V/div, 20  $\mu$ sec/div>  
 Fig. 21-N



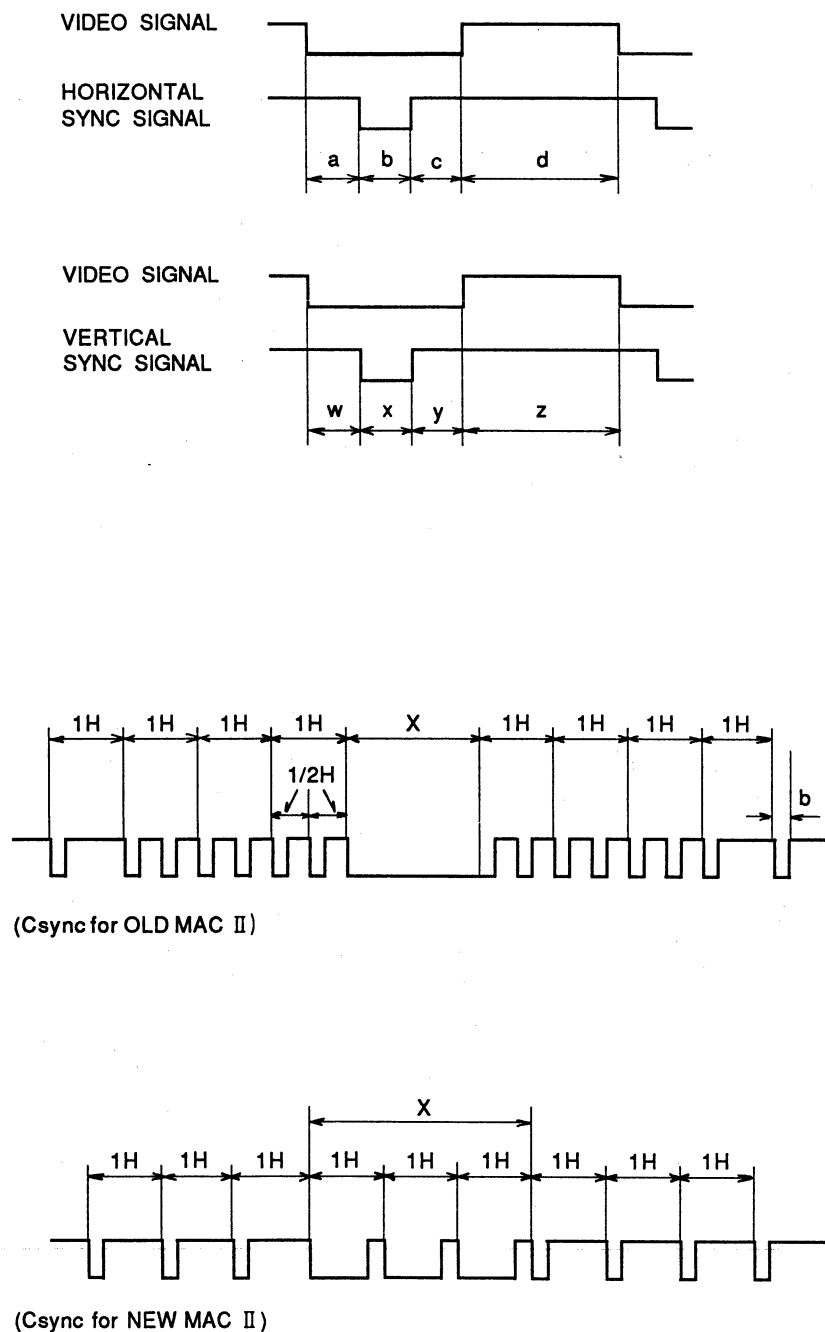
J5-14pin, IC15-5pin  
 <5V/div, 20 msec/div>  
 Fig. 21-O



CN1-4pin  
 <5V/div, 2 msec/div>  
 Fig. 21-P

## TIMING CHART

The following timing charts are applied to Tables 10 and 11.



**Fig.22**

Table 10

			1	2	3	4	5	6	7	8
			IBM			IBM		IBM	APPLE	
			VGA/CGA		VGA	EGA		CGA	MAC II Video Card	MAC +/SE
						Text 40chr	80chr/Graphic	40chr,Graphic/80chr		
			640dot			640dot		640dot	640dot	512dot
			400line	350line	480line	350line		200line	480line	342line
Hsync	FRONT PORCH a	dot	16			-7	-3	95/103	64	15
	SYNC b	dot	96			80	80	64/48	64	64
	BACK PORCH c	dot	48			39	27	113/121	96	113
	VIDEO PERIOD d	dot	640			640	640	640	640	512
	1H(a+b+c+d)	dot	800			752	744	912	864	704
		us	31.777557			46.256997	45.764901	63.696047	28.571429	44.934641
	1dot	ns	39.721946			61.511964	61.511694	69.842157	33.068783	63.827614
	1/H	KHz	31.468881			21.618351	21.850806	15.699561	35.000	22.254545
	1/dot	MHz	25.175			16.257		14.318	30.240	15.6672
	LEVEL		TTL			TTL		TTL	TTL	TTL
Vsync	SYNC POLARITY	+/-	-	+	-	+		+	-	+
	FRONT PORCH w	H	13	38	11	1		25	3	0
	SYNC x	H	2	2	2	13		3	3	4
	BACK PORCH y	H	34	59	32	2		34	39	24
	VIDEO PERIOD z	H	400	350	480	350		200	480	342
	1V(w+x+y+z)	H	449	449	525	366	366	262	525	370
		ms	14.268123	14.268123	16.683217	16.930061	16.749954	16.688364	15.000	16.625817
	1/V	Hz	70.00	70.00	59.94	59.07	59.70	59.92	66.68	60.15
	LEVEL		TTL	TTL	TTL	TTL		TTL	TTL	TTL
	SYNC	+/-	+	-	-	-		+	-	+
VIDEO	LEVEL		0.7Vp-p MAX 75ohm Load			TTL		TTL	1.0Vp-p MAX 75ohm Load	TTL
	TYPE		R, G, B			R, G, B r, g, b		R, G, B I	R, G, B	Mono Video I
REMARKS								AUTO SETUP shall be set in the 40chr-graphic mode.	Synchronous signal is Csync.	A/D converter adaptor is required.

Table 11

			9		10	11	12	13	14
			AT & T		APPLE	NEC		SHARP	APPLE
			6300WGS		APPLE IIe/IIc/GS	PC-9801		AX-286	MAC LC
			640dot		560dot	640dot		AX-386	
			350line	400line	192line	200line	400line	480line	480line
Hsync	FRONT PORCH a	dot	78		109	59	59	18	78
	SYNC b	dot	104		170	64	64	88	62
	BACK PORCH c	dot	106		73	133	85	86	116
	VIDEO PERIOD d	dot	640		560	640	640	640	640
	1H(a+b+c+d)	dot	928		912	896	848	832	896
		us	38.666667		63.696047	62.578572	40.280060	33.048659	28.595
	1dot	ns	41.666667		69.842157	69.842157	47.500071	39.721946	31.914063
	1/H	KHz	25.862069		15.699561	15.979911	24.826179	30.258	34.971149
	1/dot	MHz	24.000		14.318	14.318	21.0526	25.175	31.334149
	LEVEL		TTL		TTL	TTL		TTL	TTL
Vsync	SYNC POLARITY	+/-	+		+	-		+	-
	FRONT PORCH w	H	25	0	33	15	7	4	33
	SYNC x	H	16	16	3	8	8	12	3
	BACK PORCH y	H	41	16	34	37	25	5	39
	VIDEO PERIOD z	H	350	400	192	200	400	480	480
	1V(w+x+y+z)	H	432		262	260	440	501	525
		ms	16.704		16.688364	16.270429	17.723227	16.557379	15.000
	1/V	Hz	59.87		59.92	61.46	56.42	60.40	66.67
	LEVEL		TTL		TTL	TTL		TTL	TTL
	SYNC	+/-	+		+	-		-	-
VIDEO	LEVEL		TTL		TTL	TTL		TTL	0.7Vp-p MAX 75ohm Load
	TYPE		R, G, B I		R, G, B I	R, G, B		R, G, B r, g, b	R, G, B
REMARKS			Signal cable is required. Operates in the 400 line mode also with 350 line signal input.		Composite signal responsive A/D converter adaptor is separately required. Shall be operated in the IBM CGA mode.	Signal cable is required.			Synchronous signal is Csync.

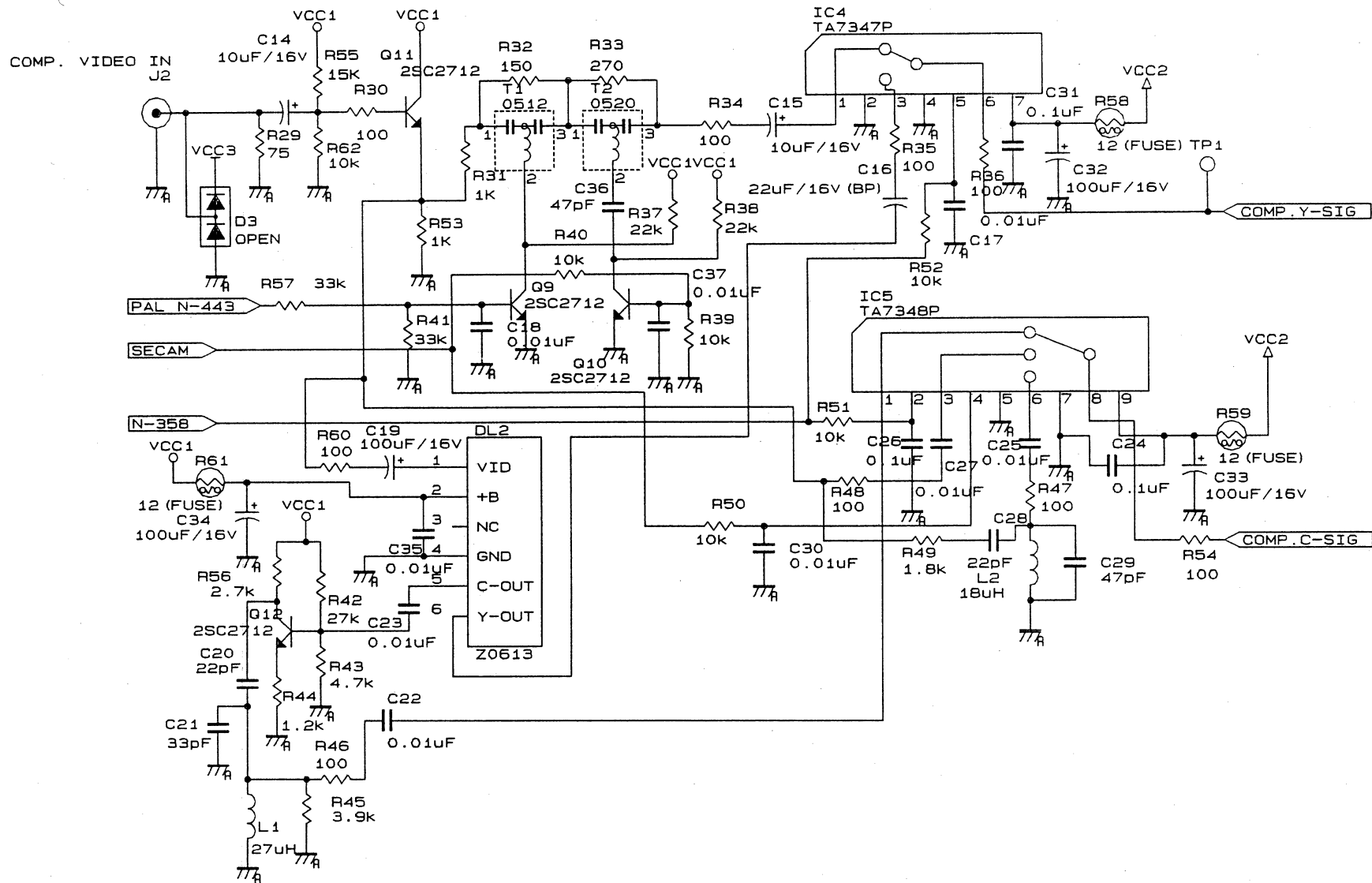


Fig. 23 CIRCUIT DIAGRAM (Y/C SECTION)





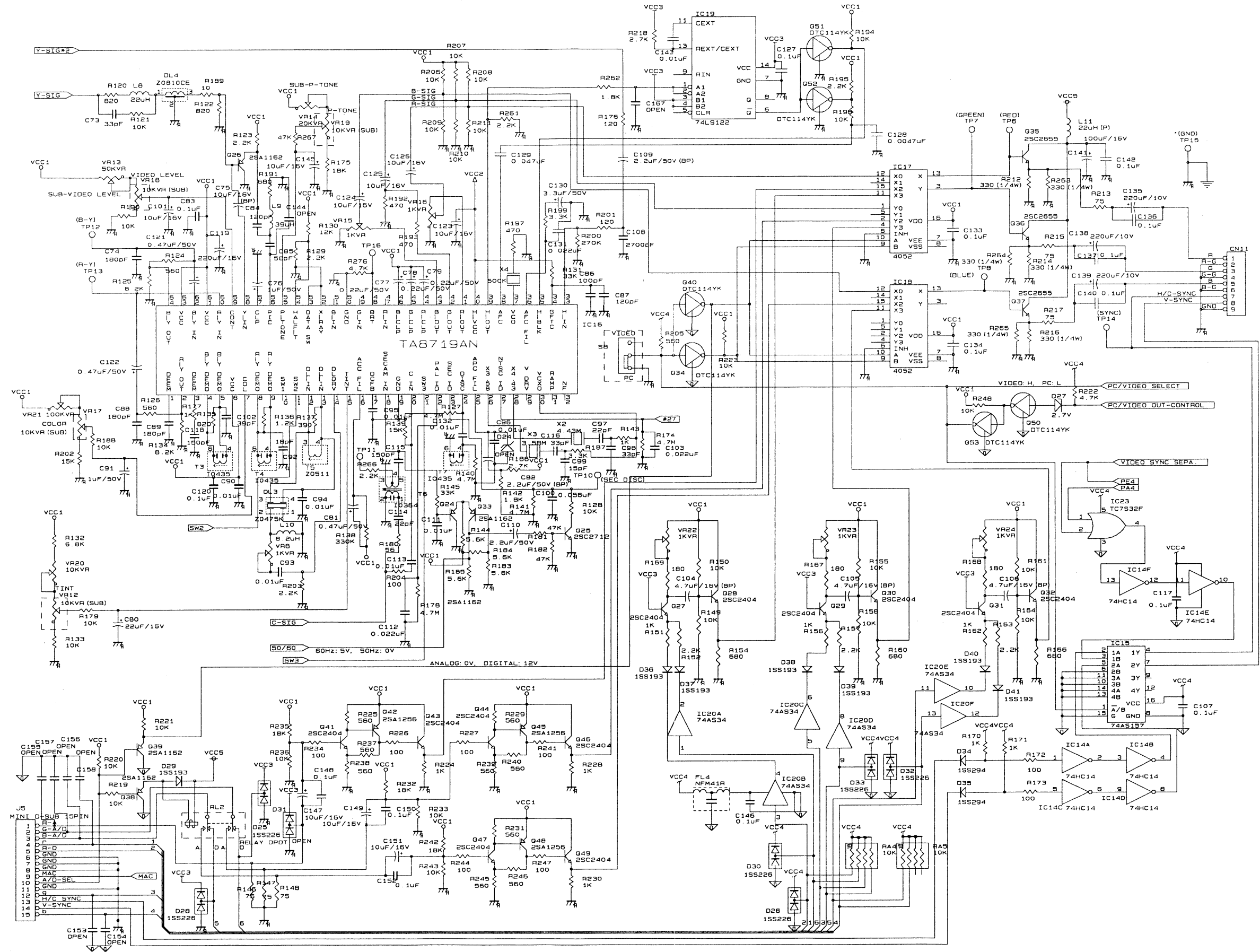


Fig. 25 CIRCUIT DIAGRAM (DECODER SECTION)

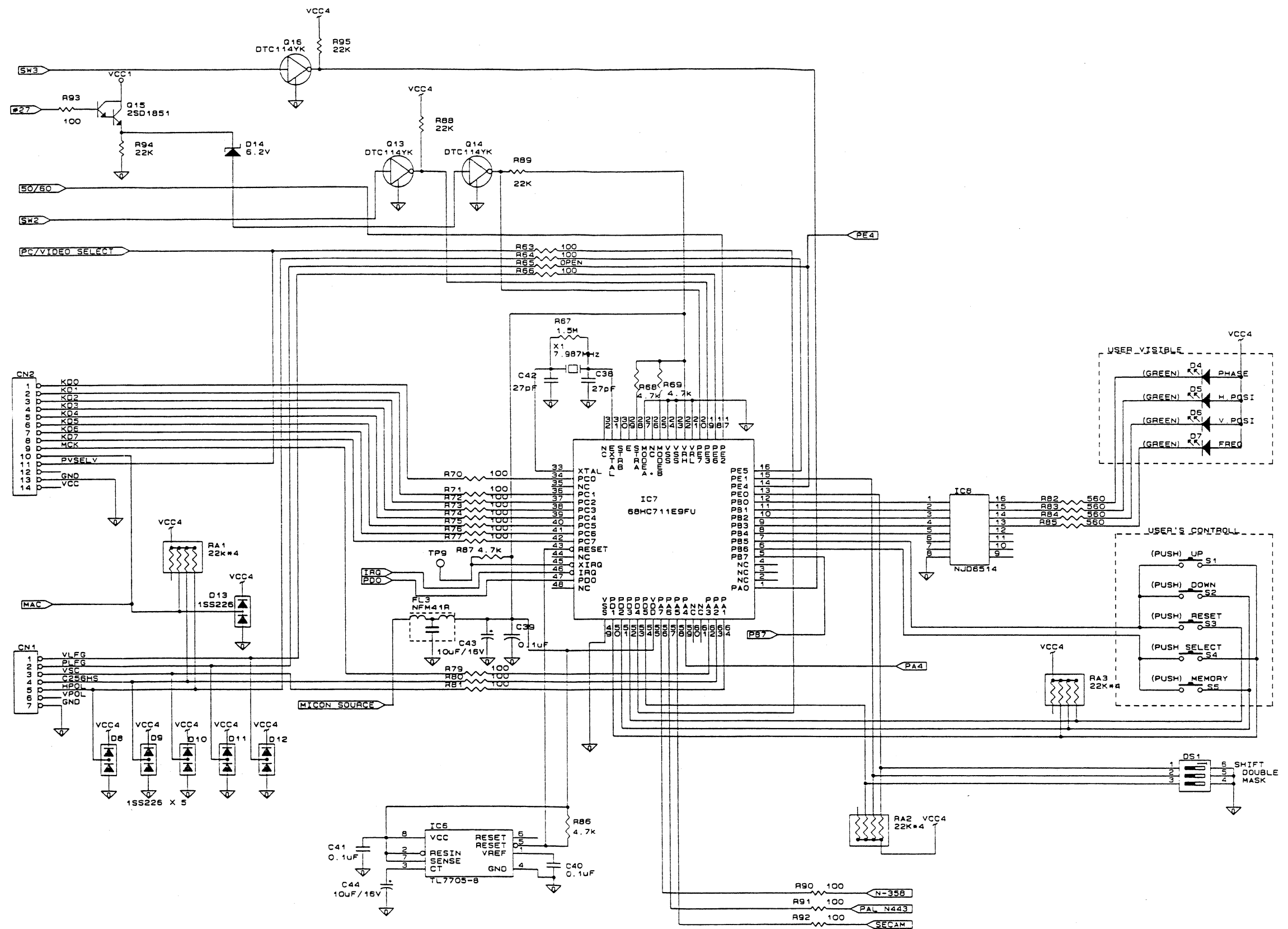


Fig. 26 CIRCUIT DIAGRAM (MICON SECTION)

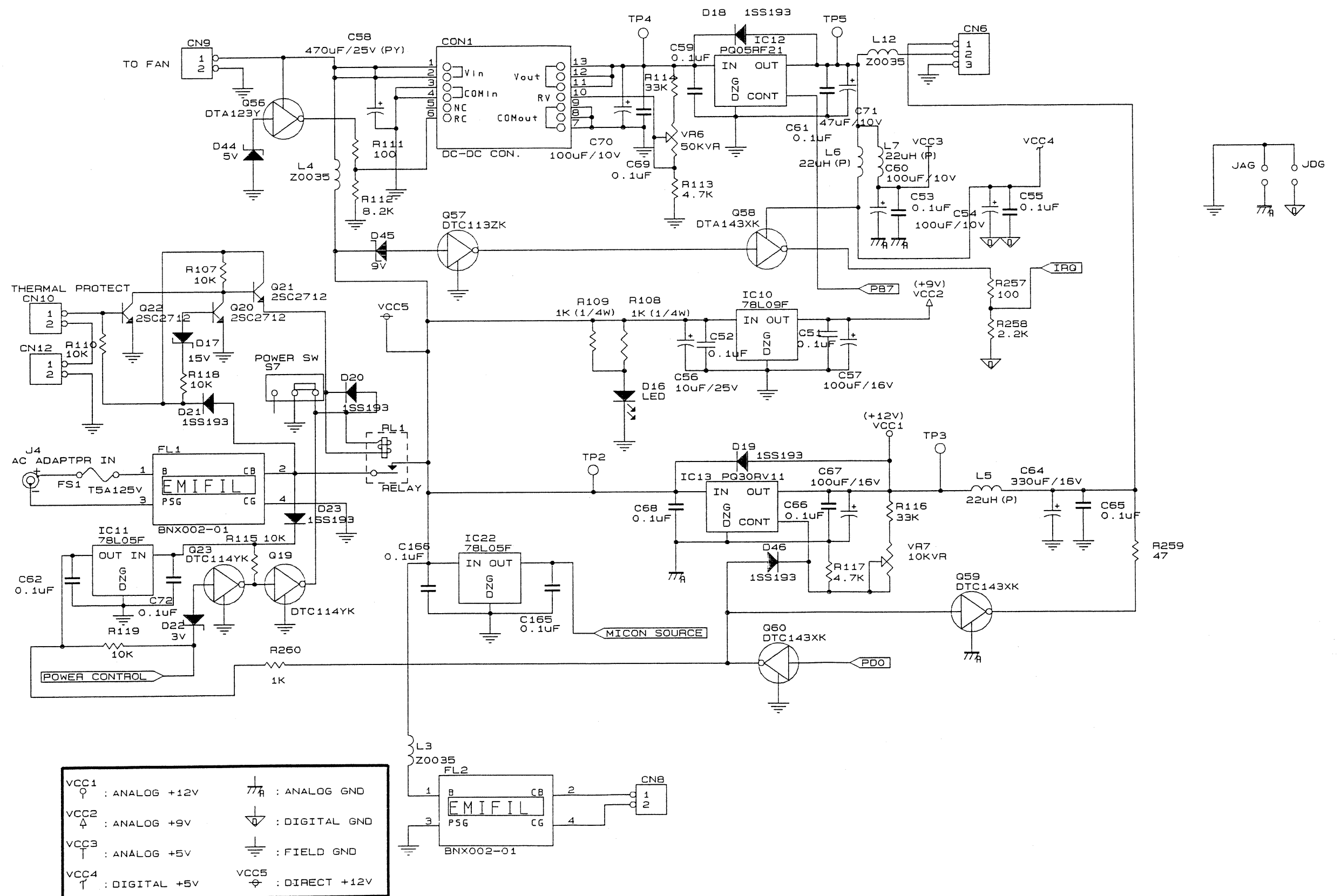


Fig. 27 CIRCUIT DIAGRAM (POWER SECTION)

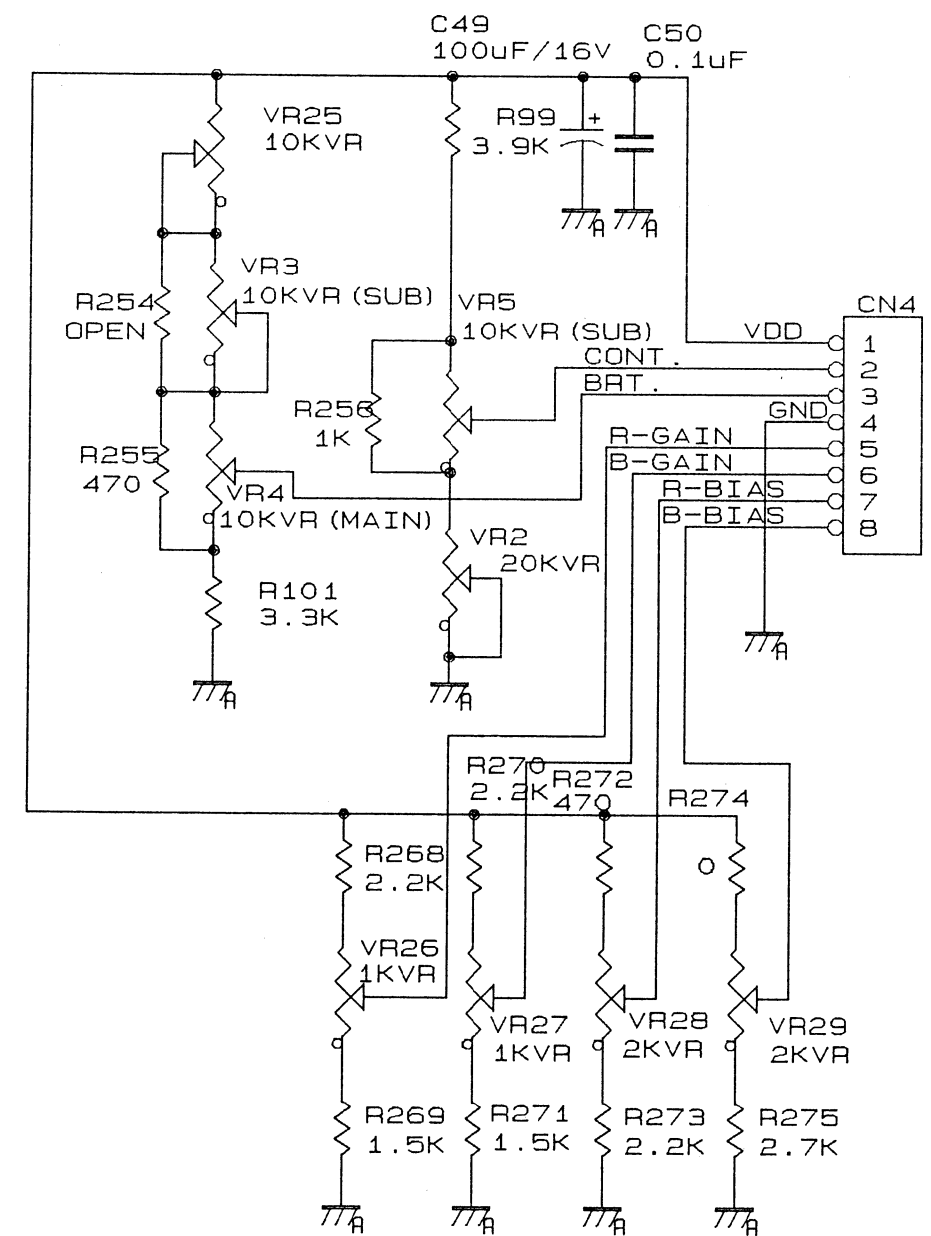
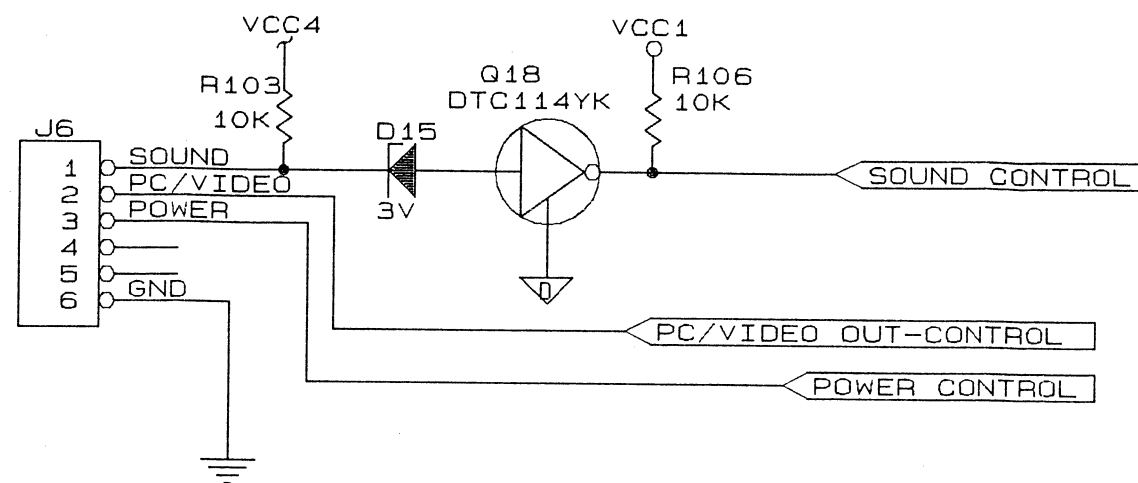
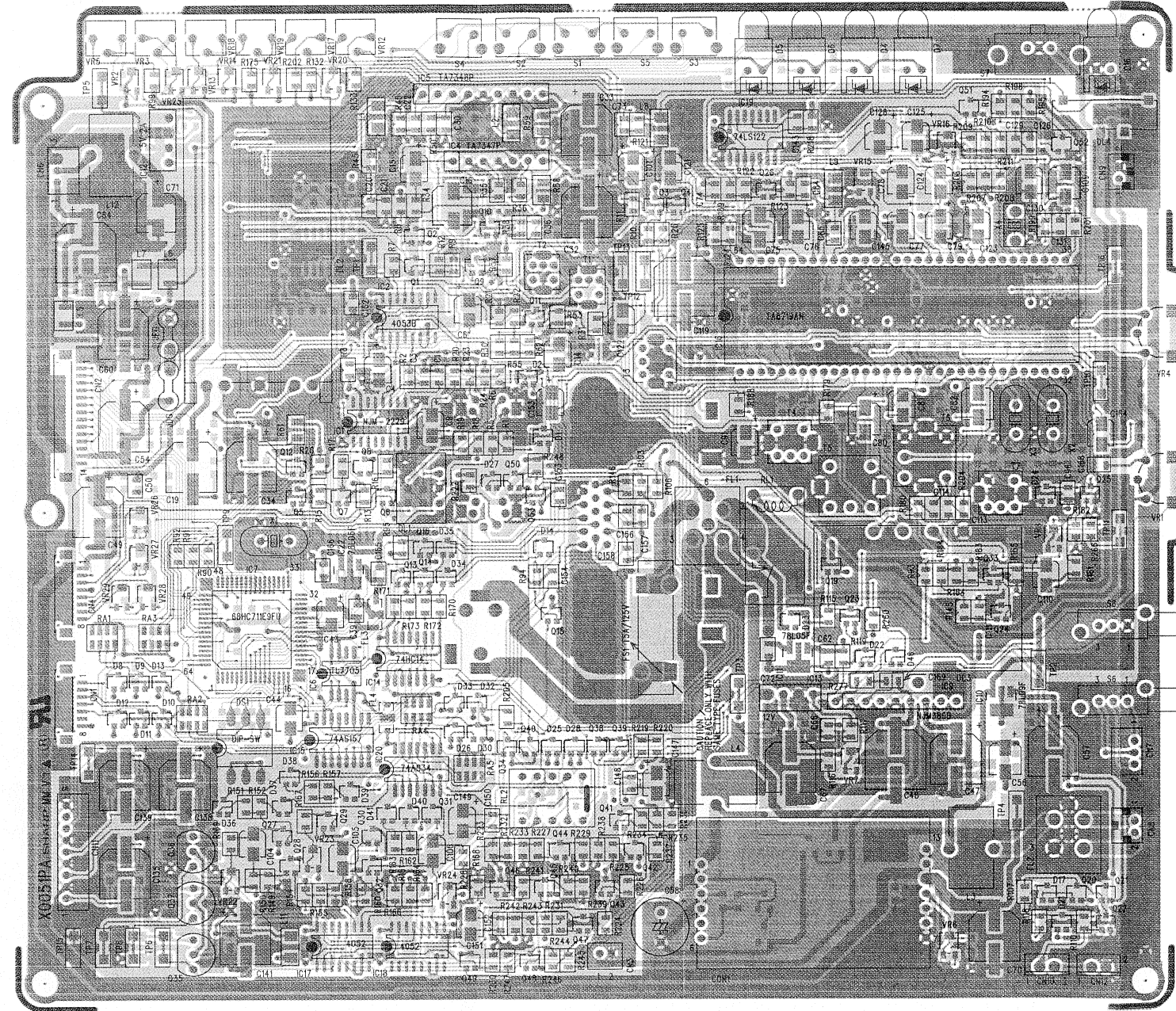


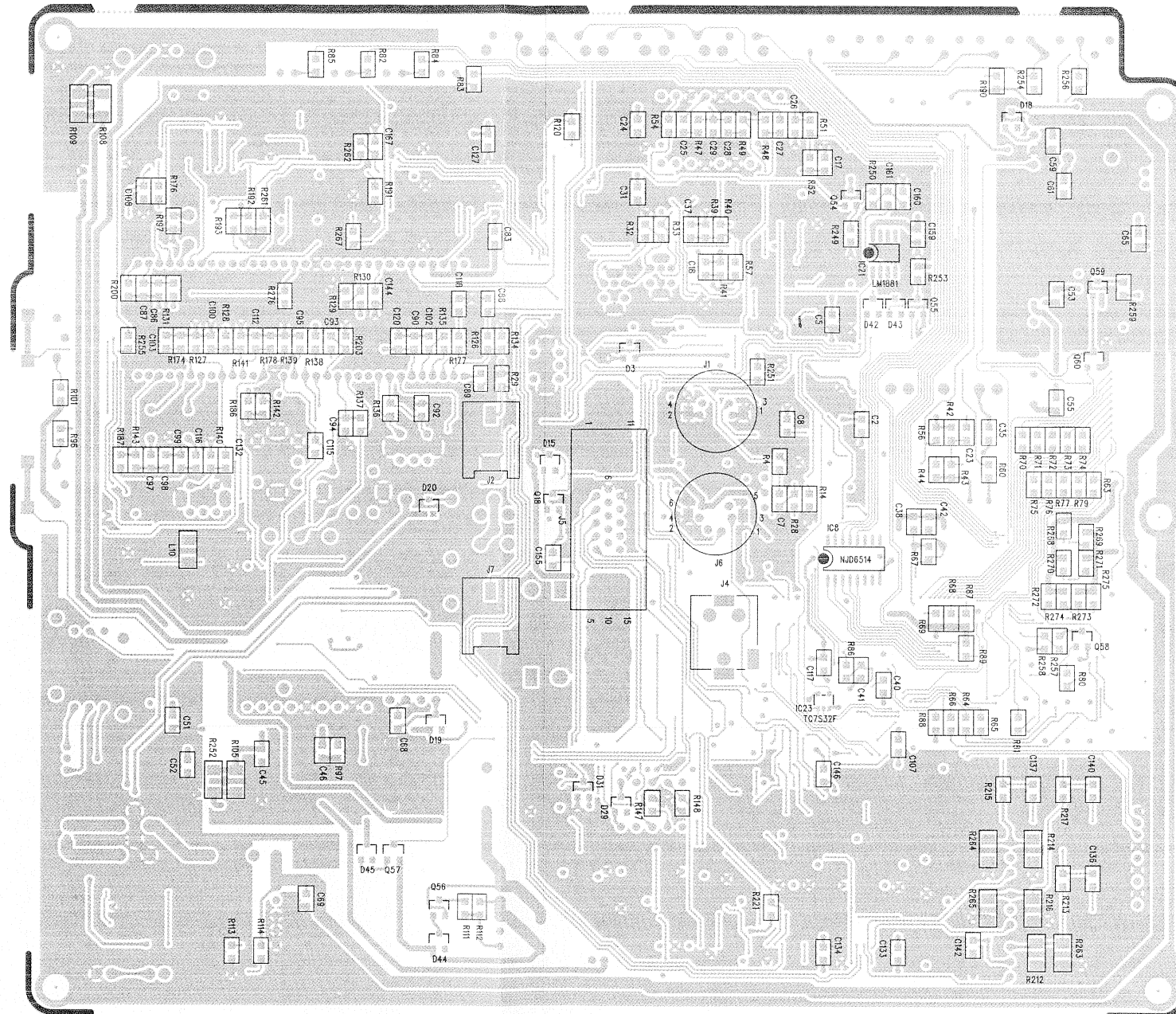
Fig. 28 CIRCUIT DIAGRAM (OTHER SECTION)



(Front side)

Fig. 29 P.W.B. PATTERN (MAIN P.W.B.)





(Back side)

# REPLACEMENT PARTS LIST

## "HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly,  
please furnish the following information.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
<b>1. IC</b>						
1-1	IC1	RH-IX2836YAZZ		SYNC DETECTOR NJM2229	1	AN
1-2	IC2	RH-IX1670PAZZ	N	ANALOG SWITCH NJU4053BM	1	AE
1-3	IC4	RH-IX1681PAZZ	N	VIDEO SWITCH TA7347P	1	AE
1-4	IC5	RH-IX1682PAZZ	N	VIDEO SWITCH TA7348P	1	AE
1-5	IC6	RH-IX0855PAZZ		TL7705CPS-B	1	AL
1-6	IC7	RH-IX1675PAZZ	N	MICRO COMPUTER 68HC711E9FU	1	BG
1-7	IC8	RH-IX1674PAZZ	N	LED DRIVER NJD6514	1	AF
1-8	IC9	RH-IX1671PAZZ	N	AUDIO AMP NJM386BL	1	AF
1-9	IC10	RH-IX1673PAZZ	N	REGULATOR 9V NJM78L09UA	1	AE
1-10	IC11, 22	RH-IX1672PAZZ	N	REGULATOR 5V NJM78L05UA	2	AE
1-11	IC12	RH-IX1668PAZZ	N	REGULATOR 5V PQ05RF21	1	AH
1-12	IC13	RH-IX1667PAZZ	N	REGULATOR 12V PQ30RV11	1	AH
1-13	IC14	RH-IX1678PAZZ	N	SN74HC14	1	AE
1-14	IC15	RH-IX1242PAZZ		SN74AS157	1	AH
1-15	IC16	RH-IX1683PAZZ	N	DECODER TA8719AN	1	AX
1-16	IC17, 18	RH-IX1669PAZZ	N	ANALOG SWITCH NJU4052BM	2	AE
1-17	IC19	RH-IX1679PAZZ	N	SN74LS122	1	AG
1-18	IC20	RH-IX1676PAZZ	N	SN74AS34	1	AF
1-19	IC21	RH-IX1295PAZZ	N	LM1881 SYNC SEPARATION	1	AP
1-20	IC23	RH-IX2850YAZZ		TC7S32F	1	AC
<b>2. LED</b>						
2-1	D4, 5, 6, 7	RH-PX0225PAZZ	N	LED (HLMP-5050)	4	AG
2-2	D16	RH-PX0226PAZZ	N	LED (HLMP-5030)	1	AG
<b>3. CONNECTOR, JACK</b>						
3-1	CN1	QCNCW0052PAZZ	N	CONNECTOR DF13C-7P-1.25V	1	AE
3-2	CN2	QCNCW0054PAZZ	N	CONNECTOR DF13C-14P-1.25V	1	AG
3-3	CN3, 9	QPLGZ0370PAZZ	N	CONNECTOR B2B-PH-K-S	2	AB
3-4	CN4	QCNCW0053PAZZ	N	CONNECTOR DF13C-8P-1.25V	1	AE
3-5	CN6	QCNCW0049PAZZ	N	CONNECTOR DF3A-3P-2DSA	1	AA
3-6	CN8	QCNCW0050PAZZ	N	CONNECTOR DF3A-2P-2DSA	1	AA
3-7	CN10, 12	QPLGZ0229PAZZ	N	CONNECTOR B2B-EH-A	2	AA
3-8	CN11	QCNCW0051PAZZ	N	CONNECTOR DF3A-9P-2DSA	1	AC
3-9	J1	QSOCZ0181PAZZ	N	S INPUT JACK TCS7948-01-201	1	AH
3-10	J2	QJAKE0005PAZZ	N	JP J2022-01-540	1	AE
3-11	J4	QJAKC0006PAZZ	N	HEC0780-01-010	1	AH
3-12	J5	QSOCZ0183PAZZ	N	CONNECTOR MINI D-SUB 15P	1	AW
3-13	J6	QSOCZ0182PAZZ	N	CONTROL JACK TCS7948-16-201	1	AK
3-14	J7	QJAKE0006PAZZ	N	JP J2022-01-530	1	AE
<b>4. FUSE, FUSEHOLDER</b>						
4-1	FS1	QFS-F0007PAZZ	N	FUSE 5A/125V	1	AE
4-2		QFSHA2008YAZZ		85PE1850	2	AA
<b>5. SWITCH</b>						
5-1	DS1	QSW-D0029PAZZ	N	DIP SW SSGM38	1	AM
5-2	S1, 2, 4, 5	QSW-P0089PAZZ	N	TACT SW SKHHLQ	4	AC
5-3	S3	QSW-P0090PAZZ	N	TACT SW SKHHLU	1	AC
5-4	S7	QSW-S0092PAZZ	N	SLIDE SW SSSF112-P06S-1	1	AF
5-5	S8	QSW-P0088PAZZ	N	TACT SW SPPJ3-ES1-PW-F	1	AK
<b>6. COIL, FILTER</b>						
6-1	DL1	RCILZ0585CEZZ	N	DELAY LINE Z0585	1	AE



NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
6-2	DL2	RCILZ0002PAZZ	N	COMB FILTER Z0613	1	AW
6-3	DL3	RCILZ0001PAZZ	N	1H DELAY LINE Z0475K	1	AN
6-4	DL4	RCILZ0810CEZZ	N	DELAY LINE Z0810	1	AM
6-5	FL1, 2	RCORF0058PAZZ		EMI FILTER BNX002-01	2	AP
6-6	FL3, 4	RFILN0013PAZZ	N	EMI FILTER NFM41R	2	AD
6-7	JDG	RCILF7872PAZZ	N	BL02RN2-R62	1	AB
6-8	L1	RCILF0015PAZZ	N	LEM3225B270K TIPL 27 $\mu$ H	1	AB
6-9	L2	RCILF0013PAZZ	N	LEM3225B180K TIPL 18 $\mu$ H	1	AB
6-10	L3, 4, 12	RTRNZ0035PAZZ		FILTER-COIL	3	AE
6-11	L5-7, 11	RCILF0017PAZZ	N	FLJ-PA22MH TIPL 22 $\mu$ H	4	AD
6-12	L8	RCILF0014PAZZ	N	LEM3225B220K TIPL 22 $\mu$ H	1	AB
6-13	L9	RCILF0016PAZZ	N	LEM3225B390K TIPL 39 $\mu$ H	1	AB
6-14	L10	RCILF0012PAZZ	N	LEM3225B8R2K TIPL 8.2 $\mu$ H	1	AB
6-15	T1	RCILIO512CEZZ	N	4.43MHz TRAP	1	AE
6-16	T2	RCILIO520CEZZ	N	3.38MHz TRAP	1	AE
6-17	T3, 4, 7	RCILIO435CEZZ	N	IF COIL IO435	3	AD
6-18	T5	RCILZ0511CEZZ	N	1H COIL Z0511	1	AD
6-19	T6	RCILIO364CEZZ	N	IF COIL IO364	1	AD
<b>7. RELAY</b>						
7-1	RL1	RRLY-2124YAZZ	N	RELAY JY-12H-K	1	AM
7-2	RL2	RRLYU0090PAZZ	N	RELAY A-12W-K	1	AT
<b>8. OSCILLATOR</b>						
8-1	X1	RCRSZ0043PAZZ		XTAL 7.9872MHz	1	AH
8-2	X2	RCRSB0002CEZZ	N	XTAL 4.43MHz	1	AF
8-3	X3	RCRSB0005CEZZ	N	XTAL 3.58MHz	1	AF
8-4	X4	RCRSZ0058PAZZ	N	XTAL 500KHz	1	AD
<b>9. VR</b>						
9-1	VR1	RVR-Z0007PAZZ	N	VR 10K (MAIN)	1	AG
9-2	VR2, 14	RVR-M0270VAZZ	N	VR 20K	2	AC
9-3	VR3, 5, 12, 17, 18, 19	RVR-M0291PAZZ	N	VR 10K (SUB)	6	AD
9-4	VR4	RVR-Z0008PAZZ	N	VR 10K	1	AG
9-5	VR6, 13	RVR-M0226VAZZ	N	VR 50K	2	AC
9-6	VR7, 20, 25	RVR-M0221VAZZ	N	VR 10K	3	AC
9-7	VR8, 15, 16, 22-24, 26, 27	RVR-M0224VAZZ	N	EVM7JSX30B13	8	AC
9-8	VR21	RVR-M0253VAZZ	N	VR 100K	1	AC
9-9	VR28, 29	RVR-M0232PAZZ		TIP-VR 2K	2	AC
<b>10. TRANSISTOR</b>						
10-1	Q1, 3, 4, 6, 8, 9, 10-12, 20-22, 25, 54	VS2SC2712-Y-1	N	2SC2712Y	14	AA
10-2	Q2, 7, 24, 26, 33, 38, 39	VS2SA1162-Y-1	N	2SA1162	7	AA
10-3	Q5, 13, 14, 16, 18, 19, 23, 34, 40, 50-53, 55	VSDTC-114YK-1	N	DTC-114YK	14	AB
10-4	Q15	VS2SD1851-TA1	N	2SD1851	1	AE
10-5	Q27-32, 41, 43, 44, 46, 47, 49	VS2SC2404-C-1	N	2SC2404-C	12	AC
10-6	Q35, 36, 37	VS2SC2655-Y-1	N	2SC2655-Y	3	AC
10-7	Q42, 45, 48	VS2SA1256E5-1	N	2SA1256E5	3	AA
10-8	Q56	VSDTA-123YK-1	N	DTA-123YK	1	AB
10-9	Q57	VSDTC-113ZK-1	N	DTC-113ZK	1	AB
10-10	Q58	VSDTA-143XK-1	N	DTA-143XK	1	AB
10-11	Q59, 60	VSDTC-143XK-1	N	DTC-143XK	2	AB
<b>11. DIODE</b>						
11-1	D8-13, 25, 26, 28, 30, 32, 33	VHD1SS226//-1		1SS226	12	AB
11-2	D14	VHERD6.2MB2-1	N	RD6R8MB3	1	AB
11-3	D15, 22, 27	VHERD2.7MB1-1	N	EDR2.7MB1	3	AB
11-4	D17	VHERD15MB3/-1	N	ERD15MB3	1	AB

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
11-5	D18-21, 23, 29, 36-43, 46	VHD1SS193//-1		1SS193	15	AA
11-6	D34, 35	VHD1SS294//-1		1SS294	2	AA
11-7	D44	VHERD5.1MB2-1	N	RD5.1MB2-1	1	AB
11-8	D45	VHERD9.1MB2-1	N	RD9.1MB2-1	1	AB
<b>12. DC-DC CONVERTER</b>						
12-1	CON1	RUNTZ0002PAZZ	N	DC-DC CONVERTER DEL05-3ROP	1	BL
<b>13. RESISTER</b>						
13-1	R1, 6, 29, 146-148, 213, 215, 217	VRS-TW2AD750J		(TW) 1/10W-75J	9	AA
13-2	R2, 19, 26, 39, 40, 50, 51, 52, 62, 103, 106, 107, 110, 115, 118, 119, 121, 128, 133, 149, 150, 155, 158, 161, 164, 179, 188, 190, 194, 198, 206-211, 219-221, 223, 233, 236, 243, 248, 253	VRS-TW2AD103J		(TW) 1/10W-10KJ	45	AA
13-3	R3, 41, 57, 114, 116, 131, 145	VRS-TW2AD333J		(TW) 1/10W-33KJ	7	AA
13-4	R4, 5, 31, 53, 143, 151, 156, 162, 170, 171, 177, 224, 228, 230, 256, 260	VRS-TW2AD102J		(TW) 1/10W-1KJ	16	AA
13-5	R7, 11, 17, 28, 30, 34-36, 46-48, 54, 60, 64, 66, 70, 71-77, 79-81, 90-93, 111, 172, 173, 204, 226, 227, 234, 241, 244, 247, 250, 257	VRS-TW2AD101J		(TW) 1/10W-100J	43	AA
13-6	R8, 13, 101, 187, 199	VRS-TW2AD332J		(TW) 1/10W-3.3KJ	5	AA
13-7	R9, 12, 14, 15, 269, 271	VRS-TW2AD152J		(TW) 1/10W-1.5KJ	6	AA
13-8	R10, 16, 25, 123, 129, 152, 157, 163, 195, 203, 249, 258, 261, 266, 268, 270, 273	VRS-TW2AD222J		(TW) 1/10W-2.2KJ	17	AA
13-9	R18, 21, 37, 38, 88, 89, 94, 95	VRS-TW2AD223J		(TW) 1/10W-22KJ	8	AA
13-10	R20, 43, 68, 69, 86, 87, 94, 113, 117, 222, 276, 246	VRS-TW2AD472J		(TW) 1/10W-4.7KJ	10	AA
13-11	R22, 42	VRS-TW2AD273J		(TW) 1/10W-27KJ	2	AA
13-12	R23	VRS-TW2AD331J		(TW) 1/10W-330J	1	AA
13-13	R24	VRS-TW2AD154J		(TW) 1/10W-150KJ	1	AA
13-14	R32	VRS-TW2AD151J		(TW) 1/10W-150J	1	AA
13-15	R33	VRS-TW2AD271J		(TW) 1/10W-270J	1	AA
13-16	R44, 136	VRS-TW2AD122J		(TW) 1/10W-1.2KJ	2	AA
13-17	R45, 99	VRS-TW2AD392J		(TW) 1/10W-3.9KJ	2	AA
13-18	R49, 142, 262	VRS-TW2AD182J		(TW) 1/10W-1.8KJ	3	AA
13-19	R55, 139, 202	VRS-TW2AD153J		(TW) 1/10W-15KJ	3	AA
13-20	R56, 186, 218, 275	VRS-TW2AD272J		(TW) 1/10W-2.7KJ	4	AA
13-21	R58, 59, 61	RR-XZ0055PAZZ	N	FUSE RESISTER RF73B2B	3	AD
13-22	R67	VRS-TW2AD155J		(TW) 1/10W-1.5MJ	1	AA
13-23	R82-85, 124, 126, 205, 225, 229, 231, 237-240, 245	VRS-TW2AD561J		(TW) 1/10W-560J	16	AA
13-24	R96	VRS-TW2AD393J		(TW) 1/10W-39KJ	1	AA
13-25	R181, 182, 251, 267	VRS-TW2AD473J		(TW) 1/10W-47KJ	4	AA
13-26	R97, 189	VRS-TW2AD100J		(TW) 1/10W-10J	2	AA
13-27	R105, 252	VRS-TW2ED560J	N	(TW) 1/4W-56J	2	AA

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
13-28	R108, 109	VRS-TW2ED102J	N	(TW) 1/4W-1KJ	2	AA
13-29	R112, 125, 134	VRS-TW2AD822J		(TW) 1/10W-8.2KJ	3	AA
13-30	R120, 122, 135	VRS-TW2AD821J		(TW) 1/10W-820J	3	AA
13-31	R127, 140, 141, 174, 178	VRS-TW2AD475J		(TW) 1/10W-4.7MJ	5	AA
13-32	R130	VRS-TW2AD123J		(TW) 1/10W-12KJ	1	AA
13-33	R132	VRS-TW2AD682J		(TW) 1/10W-6.8KJ	1	AA
13-34	R137	VRS-TW2AD391J		(TW) 1/10W-390J	1	AA
13-35	R138	VRS-TW2AD334J		(TW) 1/10W-330KJ	1	AA
13-36	R144, 183-185	VRS-TW2AD562J		(TW) 1/10W-5.6KJ	4	AA
13-37	R154, 160, 166, 191	VRS-TW2AD681J		(TW) 1/10W-680J	4	AA
13-38	R167-169	VRS-TW2AD181J		(TW) 1/10W-180J	3	AA
13-39	R175, 223, 235, 242	VRS-TW2AD183J		(TW) 1/10W-18KJ	4	AA
13-40	R176, 201	VRS-TW2AD121J		(TW) 1/10W-120J	2	AA
13-41	R180	VRS-TW2AD560J		(TW) 1/10W-56J	1	AA
13-42	R192, 193, 197, 255, 272	VRS-TW2AD471J		(TW) 1/10W-470J	5	AA
13-43	R200	VRS-TW2AD274J		(TW) 1/10W-270KJ	1	AA
13-44	R212, 214, 216, 263-265	VRS-TW2ED331J	N	(TW) 1/4W-330JT	6	AA
13-45	R259	VRS-TW2AD470J		(TW) 1/10W-47J	1	AA
13-46	R274	VRS-TW2AD0000		(TW) 1/10W-0 $\Omega$	1	AA
13-47	RA1-3	RR-KZ0093PAZZ	N	NETWORK 1/10W-22KJ	3	AB
13-48	RA4, 5	RR-KZ0094PAZZ		NETWORK 1/10W-10KJ	2	AB
<b>14. CAPACITOR</b>						
14-1	C1, 3	VCKYTV1HB102K		B/1000pF/K/50V	2	AA
14-2	C2, 5, 24, 26, 31, 39-41, 45, 50-53, 55, 59, 61, 62, 65, 66, 68, 69, 72, 83, 107, 117, 120, 127, 133, 134, 136, 137, 140, 142, 146, 148, 150, 152, 159, 161, 162, 165, 166	VCKYTV1EB104K	N	B/100000pF/K/25V	42	AB
14-3	C4, 6, 14, 15, 43, 44, 101, 123-126, 145, 147, 149, 151, 163, 164	VCEATM1CM106M	N	(WT) 10 $\mu$ F/16V	17	AC
14-4	C7, 17, 18, 22, 23, 25, 27, 30, 35, 37, 90, 93, -96, 111, 132, 143	VCKYTV1HB103K		B/10000pF/K/50V	19	AB
14-5	C8, 86	VCCCTV1H3101K	N	B/100pF/K/50V	2	AA
14-6	C9	VCEATM1EM475M	N	(WT) 4.7 $\mu$ F/25V	1	AD
14-7	C16	VCEAPN1CM226M	N	(UP) 22 $\mu$ F/16V	1	AD
14-8	C19, 32-34, 47, 49, 57, 67, 141	VCEAPP1CM107M	N	(UX) 100 $\mu$ F/16V	9	AD
14-9	C20, 28, 97, 114	VCCCTV1H3220K	N	B/22pF/K/50V	4	AA
14-10	C21, 73, 98, 116	VCCCTV1H3330K	N	B/33pF/K/50V	4	AA
14-11	C29, 36	VCCCTV1H3470K	N	B/47pF/K/50V	2	AA
14-12	C38, 42	VCCCTV1H3270K	N	B/27pF/K/50V	2	AA
14-13	C46, 129	VCKYTV1HB473K	N	B/47000pF/K/50V	2	AA
14-14	C48, 119	VCEAPP1CM227M	N	(UX) 220 $\mu$ F/16V	2	AD
14-15	C54, 60, 70	VCEAPP1AM107M	N	(UX) 100 $\mu$ F/10V	3	AD
14-16	C56	VCEATM1EM106M	N	(WT) 10 $\mu$ F/25V	1	AC
14-17	C58	RC-EZ0346PAZZ	N	(PY) 681 $\mu$ F/25V	1	AF
14-18	C64	VCEAPP1CM337M	N	(UX) 330 $\mu$ F/16V	1	AE
14-19	C71	VCEATM1AM476M	N	(WT) 47 $\mu$ F/10V	1	AC
14-20	C74, 88, 89	VCCCTV1H3181K	N	B/180pF/K/50V	3	AA
14-21	C75	VCEAPN1CM106M	N	(UP) 10 $\mu$ F/16V	1	AC
14-22	C76, 91	VCEATM1HM105M	N	(WT) 1 $\mu$ F/50V	2	AC
14-23	C77-79	VCEATM1HM224M	N	(WT) 0.22 $\mu$ F/50V	3	AC
14-24	C80	VCEATM1CM226M	N	(WT) 22 $\mu$ F/16V	1	AC

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
14-25	C81, 121, 122	VCEATM1HM474M	N	(WT) 0.47 $\mu$ F/50V	3	AC
14-26	C82, 109	VCEAPN1HM225M	N	(UP) 2.2 $\mu$ F/50V	2	AC
14-27	C84, 87	VCCCTV1H3121K	N	B/120pF/K/50V	2	AA
14-28	C85	VCCCTV1H3560K	N	B/56pF/K/50V	1	AA
14-29	C92	VCCCTV1H3180K	N	B/18pF/K/50V	1	AA
14-30	C99	VCCCTV1H3150K	N	B/15pF/K/50V	1	AA
14-31	C100	VCKYTV1HB563K	N	B/56000pF/K/50V	1	AA
14-32	C101, 112, 131	VCKYTV1HB223K	N	B/22000pF/K/50V	3	AA
14-33	C102	VCCCTV1H3390K	N	B/39pF/K/50V	1	AA
14-34	C104-106	VCEAPN1CM475M	N	(UP) 4.7 $\mu$ F/16V	3	AC
14-35	C108	VCKYTV1HB272K	N	B/2700pF/K/50V	1	AA
14-36	C110	VCEATM1HM225M	N	(WT) 2.2 $\mu$ F/50V	1	AC
14-37	C115, 118	VCCCTV1H3151K	N	B/150pF/K/50V	2	AA
14-38	C128	VCKYTV1HB472K	N	B/4700pF/K/50V	1	AA
14-39	C130	VCEATM1HM335M	N	(WT) 3.3 $\mu$ F/50V	1	AC
14-40	C135, 138, 139	VCEAPP1AM227M	N	(UX) 220 $\mu$ F/10V	3	AD
14-41	C160	VCCCTV1H3471K	N	B/470pF/K/50V	1	AA
14-42	C168	VCKYTV1HB822K	N	B/8200pF/K/50V	1	AB
<b>15. CABINET PARTS</b>						
15-1	1	DCABAO489AASA	N	CABINET A	1	BW
15-2	2	DCABBO021AASA	N	CABINET B	1	BX
15-3	3	DSOCN0803PAZZ	N	ADJUSTMENT CABLE	1	AH
15-4	4	DSOCN0804PAZZ	N	FLUG CABLE	1	AH
15-5	5	DSOCN0805PAZZ	N	CONTROL CABLE	1	AM
15-6	7	DSOCN0806PAZZ	N	INVERTER CABLE	1	AD
15-7	8	DSOCN0808PAZZ	N	SPEAKER CABLE	1	AD
15-8	9	DSOCN0809PAZZ	N	RELAY CABLE	1	AP
15-9	10	DSOCN0810PAZZ	N	SIGNAL CABLE	1	AM
15-10	11	DSOCN0811PAZZ	N	POWER SUPPLY CABLE	1	AE
15-11	12	GCOVH0150PASA	N	SPEAKER COVER	1	AE
15-12	13	GCOVH0155PASA	N	D-SUB COVER	1	AC
15-13	14	JKNBP6010PASA	N	PUSH SWITCH BUTTON	1	AE
15-14	15	JKNBZ0014PASA	N	VR KNOB	2	AE
15-15	16	LHLDW0037PAZZ	N	WIRE HOLDER A	3	AF
15-16	17	LHLDW0038PAZZ	N	WIRE HOLDER B	2	AE
15-17	18	LX-BZ0287PAZZ	N	SCREW FOR STAND	2	AD
15-18	19	LX-BZ0269PAZZ	N	SCREW FOR VR KNOB	2	AA
15-19	20	NFANR0035CEZZ	N	FAN	1	BB
15-20	21	PZETV0045PASA	N	ISOLATOR	1	AK
15-21	22	QEARP0007PASA	N	SPRING FOR GROUND	2	AD
15-22	23	VSP0028P-268N	N	SPEAKER	1	AR
15-23	24	XBBSF30P08000	N	3B+8S (BLACK)	2	AA
15-24	25	XBPSD30P06WSO	N	3P+6S (with washer)	15	AA
15-25	26	XBPSD30P18JSO	N	3P+18S (with washer)	2	AA
15-26	27	LANGK1077PASA	N	FRAME FOR STAND	1	BA
15-27	28	LANGK1078PASA	N	STAND STOPPER	2	AB
15-28	29	LPOLM0010PASA	N	STAND POLE	1	AX
15-29	30	PGUMM0001PASA	N	RUBBER A	1	AM
15-30	31	PGUMM0002PASA	N	RUBBER B	2	AG
15-31	32	XNEBN50-32000	N	NUT	1	AA
15-32	33	XRESU40-06000	N	E RING	1	AA
15-33	34	XWHBN55-10100	N	FLAT WASHER	3	AA
15-34	35	XWHJZ52-05080	N	POLY-WASHER	4	AA
15-35	36	XWSUW50-13000	N	SPRING WASHER	2	AA
15-36		PCUSU0008PAZZ	N	CUSHION	1	AL
<b>16. OTHERS</b>						
16-1		QACCV2001YAZZ	N	AC CORD	1	BA

NO.	REF.	PARTS CODE	NEW	DESCRIPTION	QTY	PRICE
16-2		TINSL0028PAZZ	N	OPERATION MANUAL	1	AZ
16-3		TLABN0027PAZZ	N	SERIAL NO. LABEL	1	AD
16-4		TLABS0037PAZZ	N	CAUTION LABEL	1	AC
16-5		UKOGD0003GEZZ		SCREW DRIVER	1	AC
16-6		DADP-0046PAZZ	N	AC ADAPTOR	1	CA
16-7		DSOCZ0070PAZZ	N	VGA CABLE	1	BN
16-8		DSOCZ0071PAZZ	N	MAC CABLE	1	BN
16-9		RCORF0078PAZZ		CUT CORE SFC-4	2	AP
16-10		RCORF0079PAZZ		CUT CORE SFC-5	2	AP
<b>17. P. W. B. ASSEMBLY</b>						
17-1		DPWB-1149PAZZ	N	MAIN P.W. B. ASSEMBLY	1	**
17-2		DUNT-0106PAZZ	N	INVERTER P.W. B. ASSEMBLY	1	BW
<b>18. UNIT</b>						
18-1		DUNTLO063PAZZ	N	LCD UNIT(LQ10M211)+BACKLIGHT UNIT	1	**
18-2		DUNT-0117PAZZ	N	BACKLIGHT UNIT	1	CU
<b>19. EXTENSION CABLE(ONLY FOR AFTER SERVICE)</b>						
19-1		DSOCN0815PAZZ	N	FLUG CABLE	1	AL
19-2		DSOCN0816PAZZ	N	SIGNAL CABLE	1	AP
19-3		DSOCN0817PAZZ	N	CONTROL CABLE	1	AM
19-4		DSOCN0818PAZZ	N	POWER SUPPLY CABLE	1	AF
19-5		DSOCN0819PAZZ	N	INVERTER CABLE	1	AF
19-6		DSOCN0820PAZZ	N	ADJUSTMENT CABLE	1	AL

# ASSEMBLY DRAWINGS

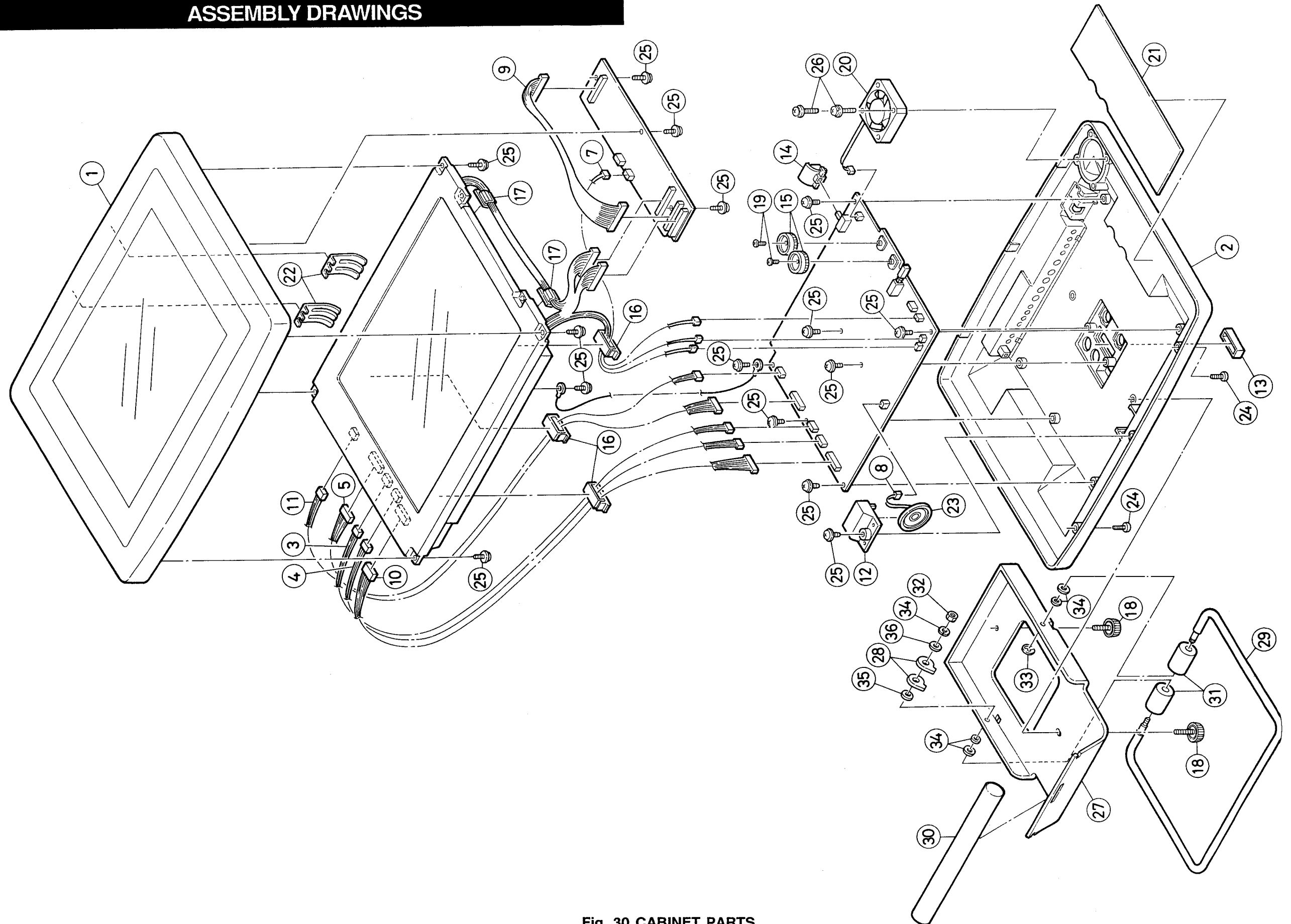


Fig. 30 CABINET PARTS

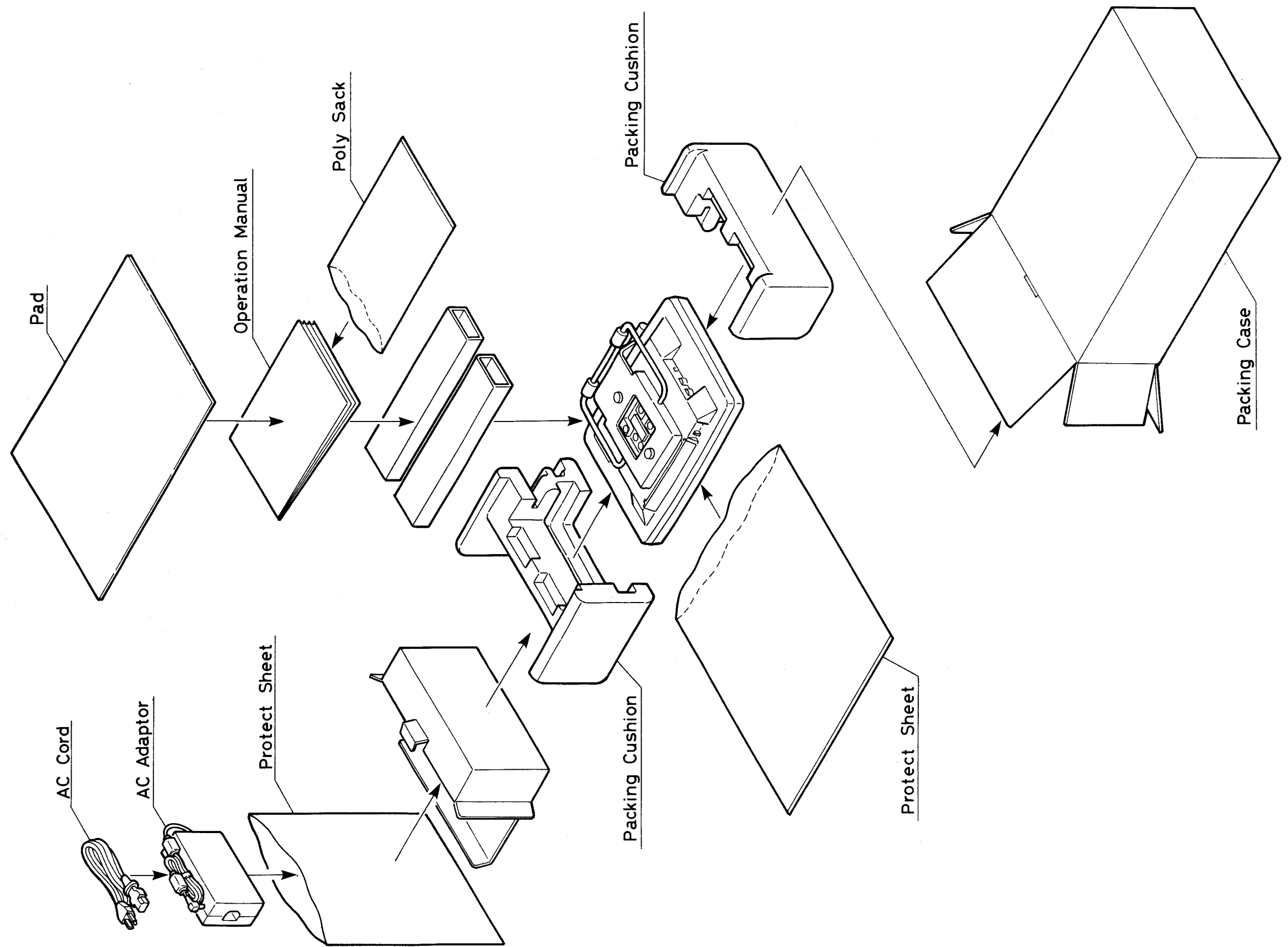
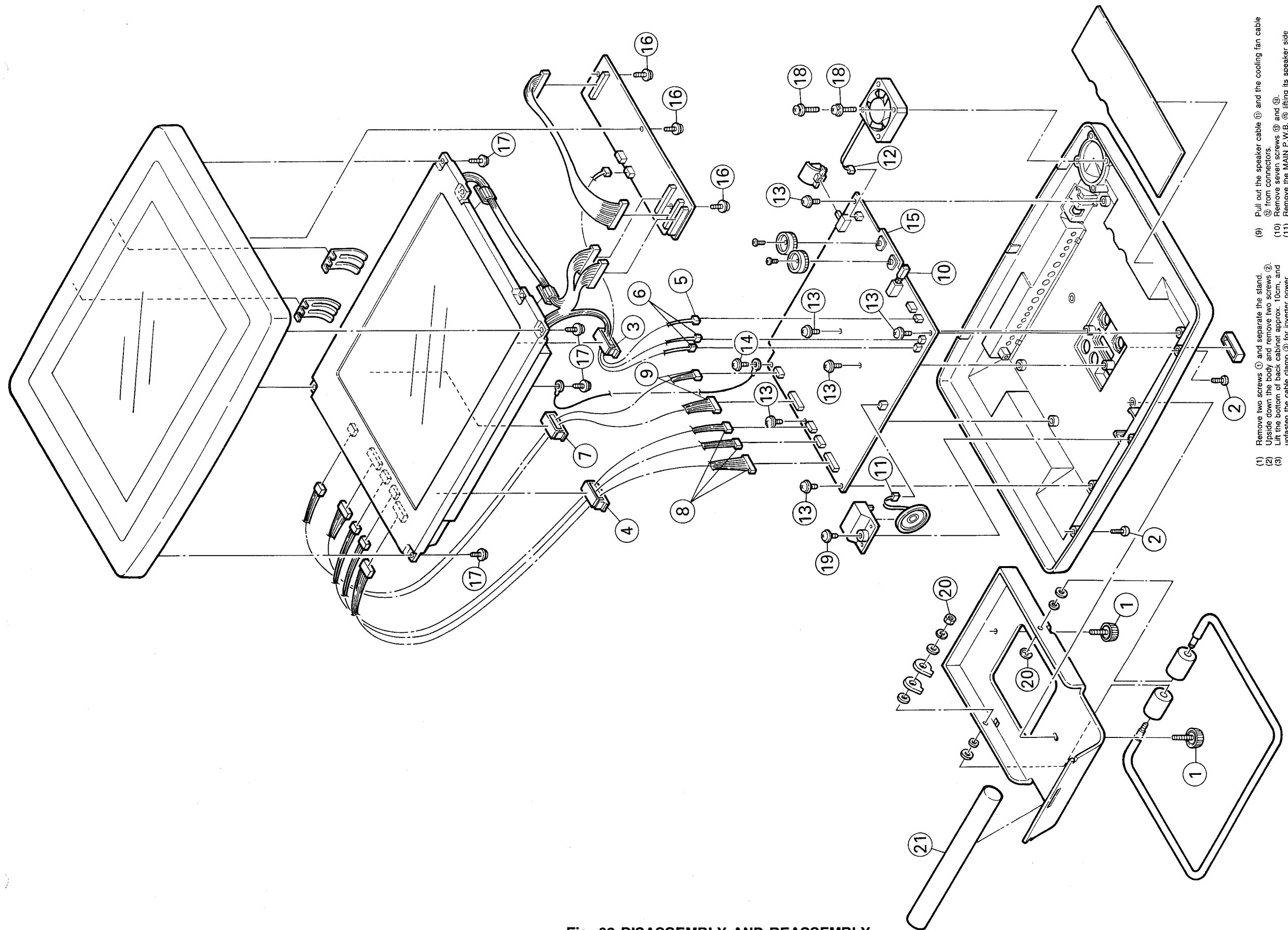


Fig. 31 PACKING OF THE SET



- (1) Remove two screws ① and separate the stand.
- (2) Upside down the body and remove two screws ②.
- (3) Lift the bottom of back cabinet approx. 10cm, and unfasten the cable clamp ③ for inverter power supply cable and backlight cables.
- (4) Unfasten the cable clamp ④ for signal cables.
- (5) Pull out the inverter power supply cable ⑤ and two backlight cables ⑥ from connectors.
- (6) Lift back cabinet enough to unfasten the cable clamp ⑦ for power supply module cables.
- (7) Open back cabinet to opposite side lifting its PC/VIDEO switch side and pull out five cables (three signal cables ⑧ and two power supply module cables ⑨) from connectors.
- (8) Set the PC/VIDEO switch to VIDEO side ( ) and remove the switch cover ⑩ pushing its root to outside from inside the bottom cabinet.
- (9) Pull out the speaker cable ⑪ and the cooling fan cable ⑫ from connectors.
- (10) Remove seven screws ⑬ and ⑭.
- (11) Remove the MAIN P.W.B. ⑮ lifting its speaker side slightly.
- (12) Remove three screws ⑯ holding the INVERTER P.W.B..
- (13) Remove four screws ⑰ holding the LCD unit.
- (14) Remove two screws ⑱ holding the cooling fan.
- (15) Remove the screw ⑲ holding the speaker cover.
- (16) Remove the nut and E ring ⑳ and separate the stand.
- (17) Separate the rubber ㉑.

Note: It may damage the PC/VIDEO switch to remove the MAIN P.W.B. strongly when it is PC side ( ).

Fig. 32 DISASSEMBLY AND REASSEMBLY



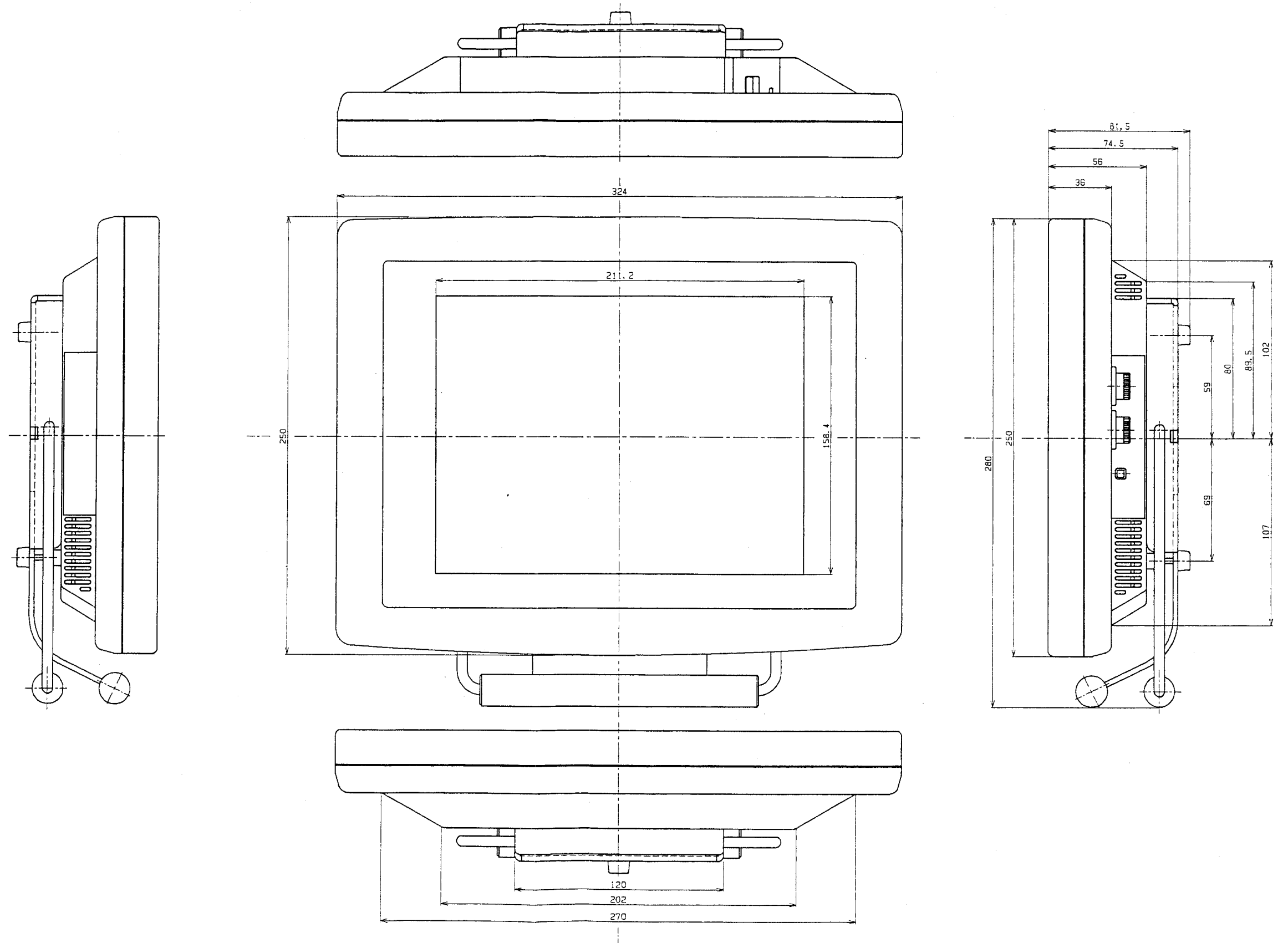


Fig. 33 EXTERNAL APPEARANCE

## FOR SERVICE ENGINEERS

We recommend to purchase the extension cables for service parts, when you repair a QD-100MM.  
The connecting method is as follows.

